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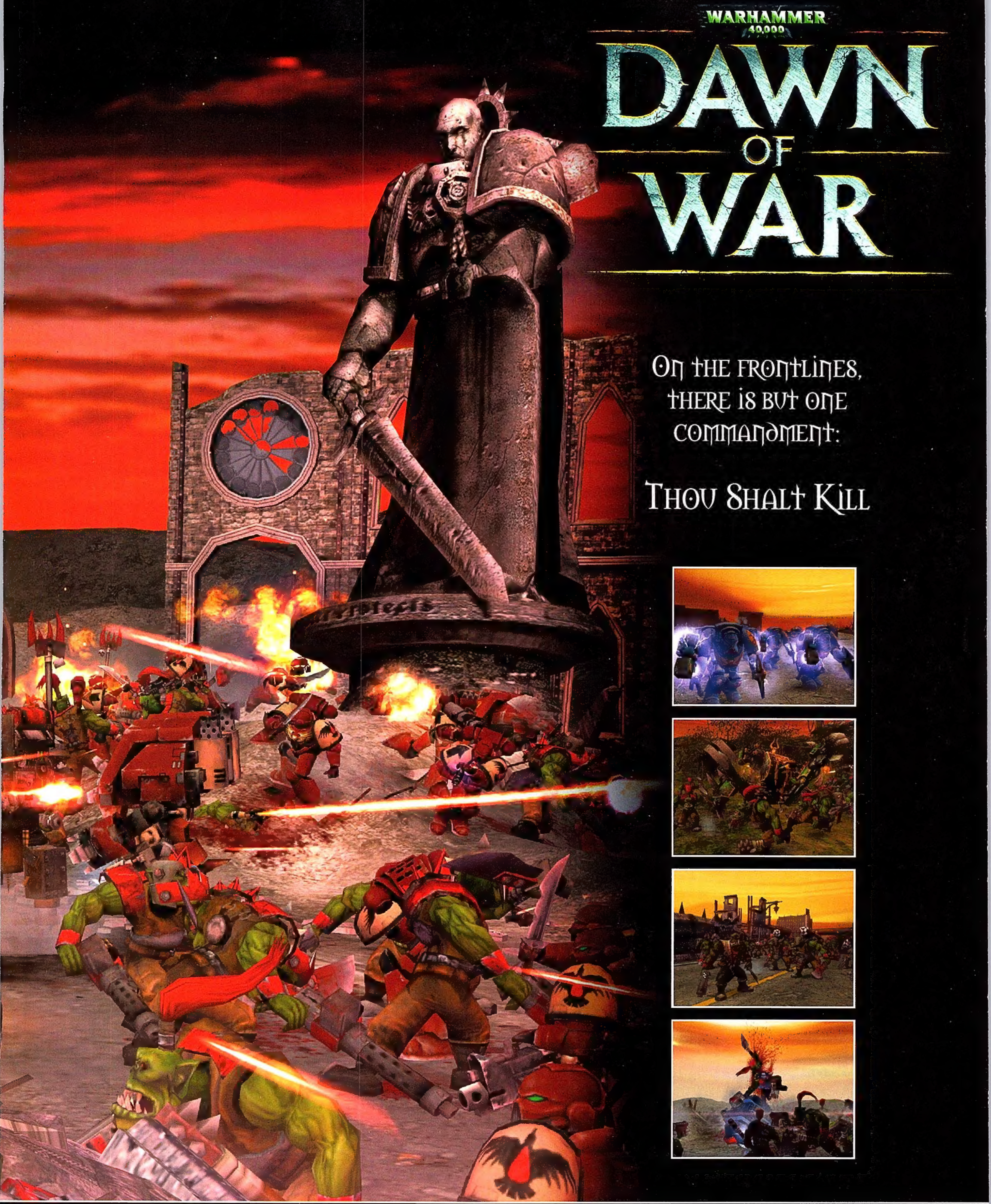
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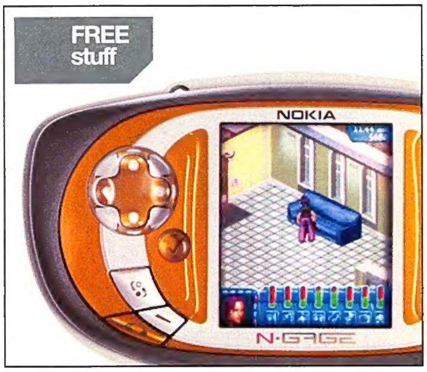

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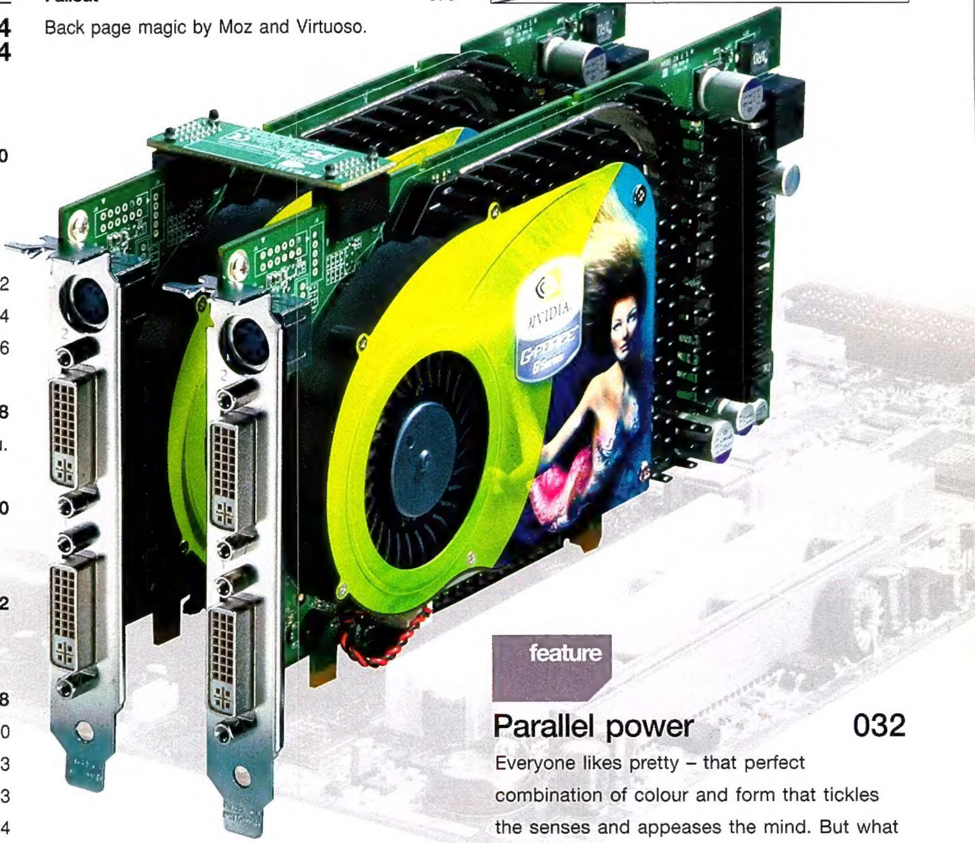
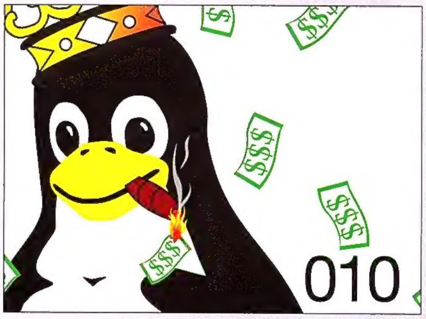


feature

Parallel power 032

Everyone likes pretty – that perfect combination of colour and form that tickles the senses and appeases the mind. But what happens when you want to be more than just pretty? Right now, today's graphics processors want to do more and be more. What's in store for the world of 3D? *Atomic* has James Wang on the case.



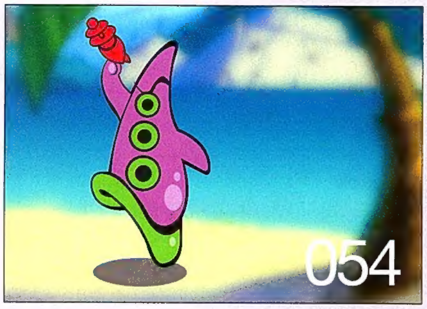
x-ray **X-Prize** **024**

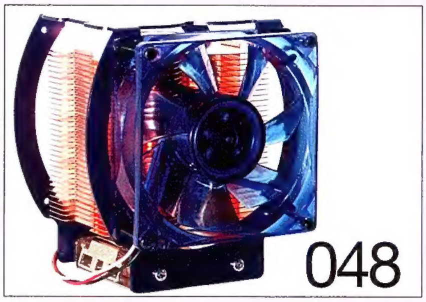
Spaceships! They make 'Vroom' sounds, not unlike the noises that kid from the Mazda ads makes, except he says 'Zoom'. But you get the idea. This month, we take this 'sound' concept a bit further – by strapping amateur rockets to it and shooting it into the stratosphere. This pretty much summarises X-Prize – a competition to get a ship into space, without the help of NASA, or those crazy Russian cosmonauts with their satellites and super space dogs. Ben Mansill has bravely stolen a front-row seat to this awesome spectacle. It's ten minus zero to lift off, and we'd sure as heck like you aboard too.

head to head **Passing the pipes** **026**

The day of PCI Express is quickly approaching, and with it, will come the demise of the Accelerated Graphics Port. Cry, for it has served us well.

But hey, there's no time to dilly-dally. John Gillooly has one hell of a collection of the latest PCI-E and AGP graphics cards and only one thing to do with them – bench those suckers to within an inch of their warranties. And, what better benchmark to use than id's new opus, Doom 3. Permission to spooge, granted!





The future past

There are moments in a gamers life when one senses a sea change – like when you're in the *zone* and you obliterate sixteen players with a single shot playing only with your toes – and you know that something special is happening. You stand at the cusp looking out, eyes wide in anticipation, muttering incoherent phrases of awe under your breath. Because even if you don't know in what form it will come, you at least know it's *there*.

Inevitably this is tied to the release of a major title, and the gamer knows in their heart that not only will they be playing it soon, but that an upgrade for their first love will likely be needed. Afterall, the PC is an *extension* of who they are, and its ability to perform is a matter of personal pride. Or more often than not, as the release of Doom 3 reveals, a matter of necessity.

Granted, you don't need the absolute best to play Doom 3, but Atomicans aren't the kind of people who settle for less. So for your pleasure, and most certainly ours, we set about the task of benchmarking the latest and greatest cards to determine just which ones offer the most compelling experience for Doom 3. You can find out the results on *page 30*.

When I look at the technology of Doom 3 I'm in awe not only of its gorgeous aesthetics, but also how far 3D gaming – and thus 3D graphics – has come. I'm showing my age, but I remember a time when video cards promoted how awesomely cool the accelerated *2D capabilities* of the cards were. Number 9 advertised how fast they could *draw windows*, while Tseng Labs boasted about the inclusion of VESA into their cards BIOS. Accelerated 3D didn't exist. When Duke Nukem 3D made its revolutionary entry into the world of gaming it used 2D cards to win your heart. Which it did, completely.

Then this upstart company called 3dfx came along and offered a 3D accelerated dream. They said the future would lie in 3D graphics, but no one believed them. Except id. I adored my first Voodoo based card – the Orchid Righteous 3D with a whopping 4MB – which required a pass through cable to pipe its 3D rendered bliss through the 2D card. Two cards working side by side to deliver smooth, silky 3D gaming. And if you had two Voodoos in SLI (that's 'Scan Live Interleave' for you young ones) you had three cards in your system dedicated to graphics. It was an awesome age. That NVIDIA should resurrect SLI as *Symmetric Link Interface* and apply a similar concept to its cards today is irony tinged with the promise of pants droppingly fast frames. It's enough to engender one to run around waving hands in the air like a monkey on crack.

Though 3dfx didn't last the run, they were right. 3D acceleration continues to evolve. How far will it go? James Wang asks and then answers precisely this on *page 32*.

This year represents a revolution in 3D gaming. Games like Doom 3 and Half Life 2 will set a new benchmark for developers, and the latest hardware from NVIDIA and ATI brings promise of games running faster, and better looking, than ever before. The original dawn of 3D acceleration was a golden age of discovery and delight. Welcome to the second age.

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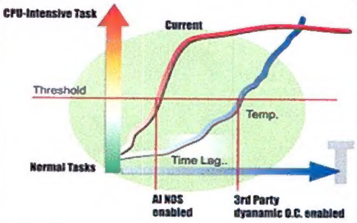

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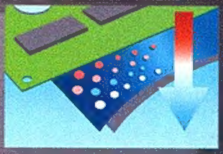

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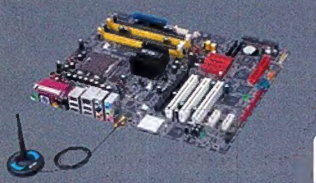

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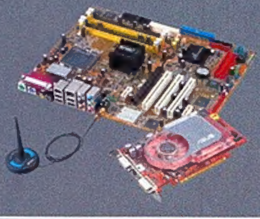

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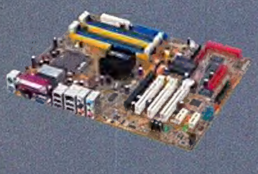

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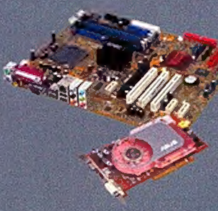

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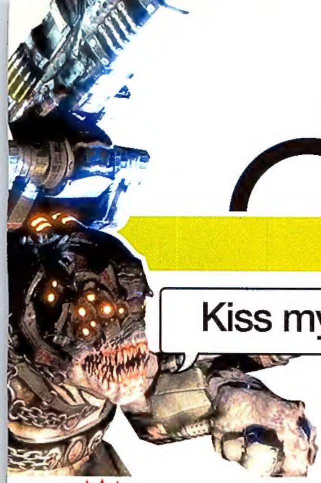


CDGuide

Tech 3D CD

Kiss my polygon!

Take some time out, right now, and appreciate the pure splendor of modern graphics technology. We've kindly loaded this month's CD with the most eye popping, effects-crazy 3D tech demos available!

THE NEWNESS

ATI tech demos

Easily one of the graphics industry's leading manufacturers of video cards and chipsets, ATI really shows its visual prowess in these five tech demos. Specifically, the movies show off the advanced pixel and vertex shader effects that are now available, thanks to the recently released X800, as well as a few just as mind-blowing capabilities of the older 9800, including a realistically rendered chimp and a short animated feature that introduces a gamut of special effects.

NVIDIA tech demos

If you're talking 3D, then you can't help but talk NVIDIA. Right now, its GeForce 6800 is owning the video card market – and rightly so, considering it's a powerful chipset with a chunky feature set that includes Shader Model 3.0. If you haven't seen what this card is capable of, then here's your chance to find out. We've stuck on some of the more advanced examples of the capabilities of NVIDIA's hardware on this month's CD. You'll be astounded – amazed even – by what it can do.

Other tech demos

If the demos from NVIDIA and ATI weren't enough, then Microsoft's XNA and the Epic's Unreal 3 Engine will more than satisfy. These super delicious examples showcase what modern developers will be able to achieve with the latest 3D software and hardware. Normal mapping, high dynamic range lighting and pure artistic talent combine to, well, gob-smack. And gob-smack they do.

Streaming Windows XP

To help you along with this month's Windows XP tutorial, which can be found in this issue, we've included a few tools and guides to make your life easier, including the Sun Java virtual machine and ISOBuster. For more information, check out *page 70*.

REGULARS

Compression tools

Compression is a godsend for modern computing – without it, the internet would be slow, files would take up many times more the space they do, and the companies behind WinZip and WinRAR would be out of business – if indeed they had started a business at all. To make sure they can continue to provide the wondrous magic that is archiving, we've included all the popular compression tools on the CD.

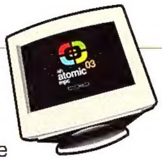
Magazine

Undoubtedly one of the more stellar parts of the magazine, the *Atomic* Benchmarks page has found a lovely home on the CD, in this category. It's got hyperlinks, colourful boxes and oodles of information! Find out what we test with and how we test, and keep an eye on this section for more magazine-related content.

Miscellaneous

We've come across some awesome programs during our time, and there's no better way to show you how much we think of them than by providing them within easy download range each month on the CD. Grab Firefox, Adobe Acrobat Reader and FileZilla, and use them in the convenience of your own home. Marvellous!

Boot sector

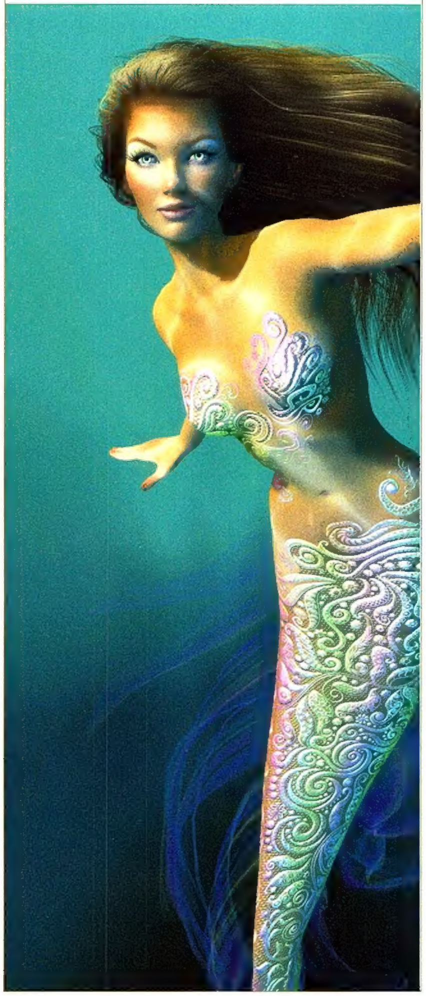


Video card not performing as it should? Having some problems with that dang motherboard chipset? Windows still not working? No worries, just check out this month's Boot sector for the latest updates and patches for your hardware and software. DirectX 9.0, NVIDIA, ATI, Intel and SiS drivers await!

WHY YOU WANT ME

- See the best game visuals – ever
- Streamline your Windows XP install
- Newest drivers for everything you own
- Latest versions of top free software

It's one heck of a CD this month, but we're always looking to make it better. If you have any ideas or suggestions for content you'd like to see on *Atomic's* cover disc, drop us an email at cd@atomicmpc.com.au. If we think it's great, then we'll stick it on. For now, enjoy this month's fantastic CD!



News

ShortCircuits

- Last month we saw the first mobile phone virus, EPOC.Cabir. This month it's the first Pocket PC virus. WinCE4.Dust, or Duts.1502, is hand-coded in assembly for ARM processors, and as such, will only function on ARM-based Pocket PCs. It contains no payload, and in fact is nice enough to ask if you'd like to be infected or not, prompting the user with a dialog box.

- Apple is introducing a new build of its popular iPod mobile music player. According to Apple's website (www.apple.com), the new model will feature a more efficient battery, allowing it to operate for 12 hours between charges; weigh less; take up less space and support data transfers via USB 2.0 and Firewire. Additionally, the new iPod will be some US$100 cheaper than previous generations.

- For the first time, in, forever, Internet Explorer has slipped in popularity... by a single percent, according to Research company WebSideStory (www.websidestory.com). It's not an unusual report, considering how hard malware is targeting Microsoft's venerable browser. More and more users are switching over to third party alternatives, thanks to almost daily reports from security firms of exploits and vulnerabilities in the program.

- It's not just Windows that's vulnerable to exploits; just recently a buffer overflow was discovered in 2015's Medal of Honour. The bug only affects clients in a LAN environment running on a dedicated server – funnily enough, the GameSpy code behind its internet multiplayer is not vulnerable. Neither the developer or EA had a patch available at the time of writing, but a third party fix is downloadable from here: aluigi.altervista.org/patches/mohaaboffix.zip

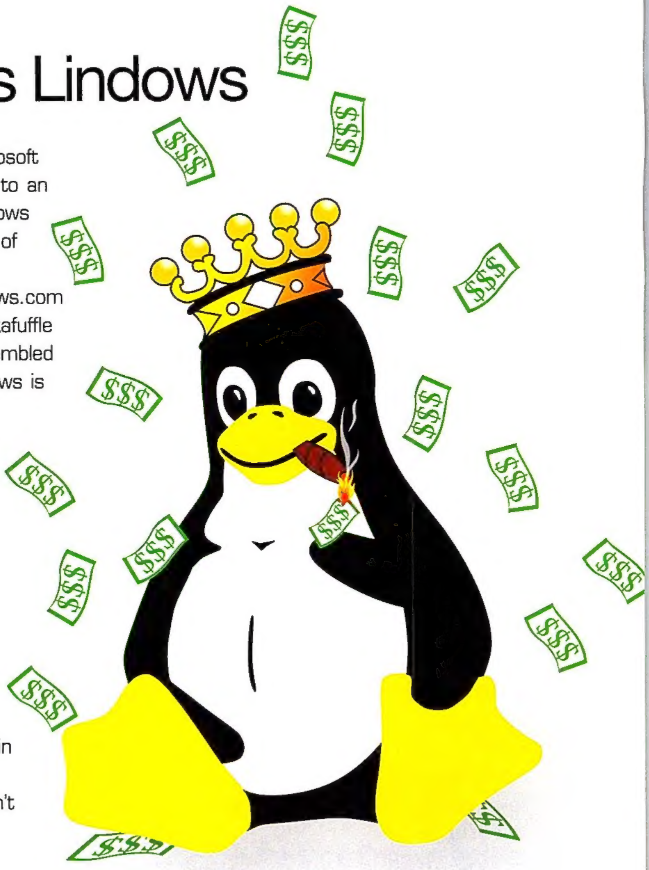
Windows pays Lindows

The legal shenanigans between Microsoft and Lindows.com have finally come to an end, with Microsoft purchasing the Lindows trademark and domain for the tidy sum of US$20 million.

Back in 2001, Microsoft sued Lindows.com for trademark infringement. The major kafuffle was that the word 'Lindows' closely resembled 'Windows', and as is well known, Windows is one of Microsoft's most precious darlings. Anything sharing a name that even remotely looks like, could possibly be, or even hints that it might possess a characteristic similar to the word 'Windows', such as a serif or glyph, has to be annihilated, if that makes any sense. No, didn't make much sense to us either.

After three or so years of arguing, February this year saw a District Court in Seattle, rule that 'windows' was a fairly generic word and Microsoft really couldn't launch legal paper airplanes to bomb Lindows out of existence.

Microsoft filed an appeal, which was overturned. The last avenue for the software giant, it seems, was a monetary one. Things now appear to be settled. It goes without saying, it's unlikely Microsoft will release a product under the Lindows trademark, unless it's a font maybe.



Seagate sinks

Seagate's latest financial release shows the company suffering a net loss of US$33 million in the fourth quarter of 2004.

The release goes on to say that US$39 million was spent on restructuring, and Seagate's chairman Steve Luczo mentions 'market dynamics' caused the company some trouble in 2004.

While the news is a little surprising to hear – your average tech head has a negligible interest in the fiscal machinations of their favourite computer component manufacturer – it isn't all bad, with Luczo reassuring Seagate stakeholders further on in the press release with news that it will be providing a variety of markets with storage products in 2005, ranging from notebooks to digital camcorders, as well as 'handheld devices' – most likely MP3 players.

Overall, fans of Seagate's hard disks shouldn't be concerned; the company shipped almost 44 million ATA drives in the last quarter alone, and its range of Barracuda drives are still very popular among enthusiasts.

Google doomed

According to various anti-virus vendors, the latest variant of the MyDoom mass-mailing worm, MyDoom.M, sends a flood of requests to the Google and Yahoo search engines, among others. These requests slow performance and increase the time it takes for all queries to be processed. Additionally, by its nature as an email worm, the virus affects the performance of all internet-connected mail servers whether they are infected or not.

Symantec's Security Response website, www.sarc.com, reports that the search engine requests aren't by any means random, and in fact help further the propogation of the worm. The virus uses the websites' search capabilities for the purpose of 'harvest[ing] additional email addresses for possible distribution'. This is in addition to the normal address harvesting the MyDoom virus performs on address book.

Like most mass-mailing worms, MyDoom.M requires the user to open and run a file attached to the infected email. While its recommended users keep their virus definitions up-to-date, they should also err on the side of caution and avoid opening emails from unsolicited sources.

In other words, use some common sense.

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Tollgates on the upgrade path

Daniel Rutter talks tolls and the inevitable variable of the upgrade path.

You're supposed to be able to upgrade PCs. That's one of the big advantages of an open architecture; standardised, interchangeable components.

Now, we all know that's not true all the time. Brand-name proprietary PCs are often hard enough to *repair*, much less upgrade; it can be disturbingly difficult to even add more RAM and a bigger hard drive, let alone swap out the motherboard.

And, at the other end of the nerd spectrum, really cutting-edge machines can't often be turned into another really cutting-edge machine a year later, without a complete everything-but-the-case brain transplant.

But, by and large, worthwhile upgrades are often possible. New CPU, more RAM, better video card, another hard drive; ten minutes' work and you've pretty much got a brand new PC.

Every now and then, though, there's a big nasty discontinuity. Stuff that doesn't work with any existing stuff.

This whole BTX/Socket T thing, for instance. It is to upgraders as gold dust is to Cybermen.

BTX is supposed to make PCs run cooler and quieter, thanks primarily to a new *giant* bolt-mount heat sink standard. BTX doesn't have anything else to commend it over ATX, microATX and FlexATX. But Intel love BTX. They want it to be the industry standard. Next week, by preference.

The basic BTX case form factor is not just ATX with the mobo on the other side and the PSU at the bottom instead of the top. BTX also tells motherboard makers how to lay out their boards – not only the slots, but the CPU and the RAM too. This is essential if you're going to be able to integrate some cooling ducts into the case, but it's a big problem for 64-bit AMD systems.

The AMD64 processors have the memory controller on the CPU, so they need the circuit traces between the CPU and the memory modules to be short, and similar in length. Ain't gonna happen with BTX. If nobody ever solves this problem, and if Intel stick to their guns, then case makers who don't want to give up on half of the market are going to have to split up their product lines and factory tooling. They are not happy about this prospect.

It's possible that case makers will follow Lian-Li's lead and start making 'upside down' ATX cases that can share many parts with a BTX sibling, but it won't be as clean a transition as the AT-to-ATX one. Which took a whole four years.

> Really cutting-edge machines can't be turned into another really cutting-edge machine a year later, without an everything-but-the-case brain transplant.

And then there's Socket T, a.k.a. LGA-775, which is what you're going to use if you want to keep on the cutting edge of Intel's desktop product line.

Compatibility-breaking socket changes aren't anything new. The P4 started out on the 'Up Yours, Early Adopters!' Socket 423, then moved to Socket 478 about eight minutes later. AMD should be commended for sticking with Socket A for so long, but now people trying to make sense of the AMD64 lineup have to cope with 940, 939 and 754-pin sockets, all at once.

But Intel want to stop making CPUs with pins on them, partly because customers bend the pins, and then send the chip back for a warranty replacement. So as you're by now aware they've switched to the radically different LGA-775, with the pins on the socket and little 'cups' on the chip. People are still going to bend the pins, of course, and thereby bork the whole motherboard, but at least that probably won't be Intel's problem! Hurrah!

Buy LGA-775 now and you get an 'x16'-speed PCI Express (PCI-E) video card slot, a few regular PCI slots, and possibly also one or more of those tiny Audio Modem Riser-like x1 PCI-E slots, for cards that nobody yet owns.

PCI Express is a great new bus and all, but it doesn't offer any significant extra speed for current graphics hardware. It's up to twice as fast as AGP, but like the AGP bus speed bumps down the years, this means little. PCI-E for video is no real upgrade to speak of at all.

LG-775 boards with an AGP slot are promised at some point, but as I write this they aren't even at the prototype stage.

Intel aren't *completely* nuts; they haven't made DDR2 memory essential on any Socket T boards except ones powered by the top-end 925X chipset. Everything else can use regular DDR. Which is good, because DDR2 is not yet any faster than DDR.

People are going to buy DDR2 Socket T systems, though, just so that they can get the fanciest possible base for their big fat too-hot Socket T Prescott P4 that runs a whole 6 percent faster than the fastest Socket 478 model.

Heck, people are probably even going to buy server-chipset BTX systems with two PCI-E video slots, so that they can install a pair of NVIDIA cards in Scan Line Interlea...I'm sorry, Scalable Link Interface mode, and run their games a whopping *five* times faster than they need to, instead of only 2.8 times.

Everybody else, though, will realise that early BTX adoption offers a whole bunch of absolutely nothin', and that there's never been a better time to wait for a standard to bounce rudely off the real world and turn into something people can actually use.

ISA slots hung around for five years after they were made obsolete.

Anyone want to lay odds on ATX lasting longer?

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A tale of two people

Ben Mansill thinks that the following tale may be true. Even if it's not, it probably will be one day.

There's a kid in a class at the school around the corner. He is sad, mostly, and has very few friends. Most days the big kids bash him. He slowly grows taller, but is shrinking inside himself. He hates this world and wants only to escape its unrelenting torment.

There's a bloke on the forums of an internet site. He's so cool. Nobody knows what he looks like, but they imagine he must be a good-looking dude with a hot girlfriend. He's smart with all the right things to say. He's funny with crack-ups that everyone loves. He's the main man.

But nobody who knew either of them could ever believe they were one and the same.

The kid too scared to speak up in class can stand in front of a thousand people online and have them all loving every word he utters. He is confident. Relaxed. Happy. He is popular. Adored.

He is not fooling anyone. Not on purpose, at least. He is being honest with his friends, honest with himself. His 'online persona' is the real him. It is his natural self, flying with uninhibited freedom to explore intellect and emotion, and to share what he finds with his online friends.

Sometimes people try and be mean to him in the forums. There are always mean people everywhere. It doesn't hurt him though. He doesn't even mind one little bit. When a bully tries to upset him he just laughs, thinks for a moment, and delivers a comeback that turns the tables on the fool. He wins the fight with everyone watching. He can do that online. He's a big guy. He executes with wit and words.

He wishes he were big when the school bullies are hitting him, but all he can do is cry and try to make himself smaller. As they kick him and call him names, he closes his eyes and wishes they would come into his forum one day. He would show them no mercy. He would destroy them.

There's a girl in the class of the boy who gets bashed. She's super-popular. She's always yabbering away with her friends about something or another. Always giggling about silly little things. She takes her little red Britney Spears diary from her Justin Timberlake backpack, and scribbles a note that she passes to her friends while teacher is talking. She can't help it. She's a chatterbox and loves talking about any old nothing.

The boy thinks she's a bit thick. Most of the boys do. She's pretty though, so they laugh at her dumb jokes. Her friends wish the boys liked them as much, and tell her that all the time.

> **The kid too scared to speak up in class can stand in front of a thousand people online and have them all loving every word he utters. He is confident. Relaxed. Happy.**

She knows why people like her, and gives them what they want. It's not her true self though. She has somewhere else to go for that.

Her brother owns a computer, which their parents bought for his homework. Here, at home, away from the day, the girl comes alive. Most nights, straight after dinner when the family are watching television, she will sit at her brother's computer and talk in a different way. She will never tell her school friends about this. Nerds are uncool, after all.

It all began one Sunday when she was bored. Her brother had left the house, but his computer screen still flowed with moving lines of words, alive, it seemed. It was an internet chatroom, and she could see her brother's friends talking with each other. A natural communicator, the girl watched intrigued as the boys talked with type. Feeling mischievous, she decided to pretend to be her brother and try and get him in trouble. She joined in the conversation effortlessly and a magic enveloped her, just like that. Plans of sibling evil were quickly forgotten, as she discovered to her surprise and delight that these boys were funny and interesting. Their talk sparkled with wit she was unfamiliar with, but slid easily into herself. She stayed there for hours.

Hours ballooned into months and soon felt like forever.

The girl now lived in two worlds; engulfed by one, passing time in the other. The only link she allowed herself was choosing her favourite colour as her online name, because *nobody* used their *real* name online. She communicated with words, not actions or appearances. She judged, and was judged, by quality of heart, mind and character. She talked not of her life, but of the world, of her thoughts, of the lives of others, of anything but school. She still liked chatrooms, but had fallen deep into her new wonder. She especially liked forums. The people there were real characters.

She had her favourite, too: a boy who she knew little of, but was thrilled by. He was warm and kind, funny and smart. On the forums they always looked for each other and played endless games with words. Lifting and challenging each other. Backing up, teasing and laughing. She was being only herself, which felt good, talking with this boy who was clearly being only himself too. They felt like a couple sometimes, and had even said so, which she liked a lot.

Back at school the boy who gets bashed sits near the back of the class, as he always does. Nearby are the girls who never shut up. He stares at the pretty girl in the red dress, his eyes not quite focussed. His mind is elsewhere.

The boys who like hitting him all want the pretty girl. He isn't sure why she never lets them have her, but cares little. For he has a girlfriend, a real one, a far better one than the girl in his near vision. He smiles, as he daydreams of the girl who calls herself Red.

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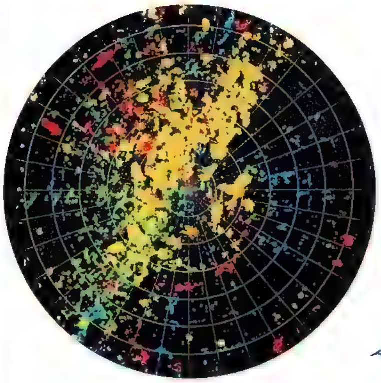

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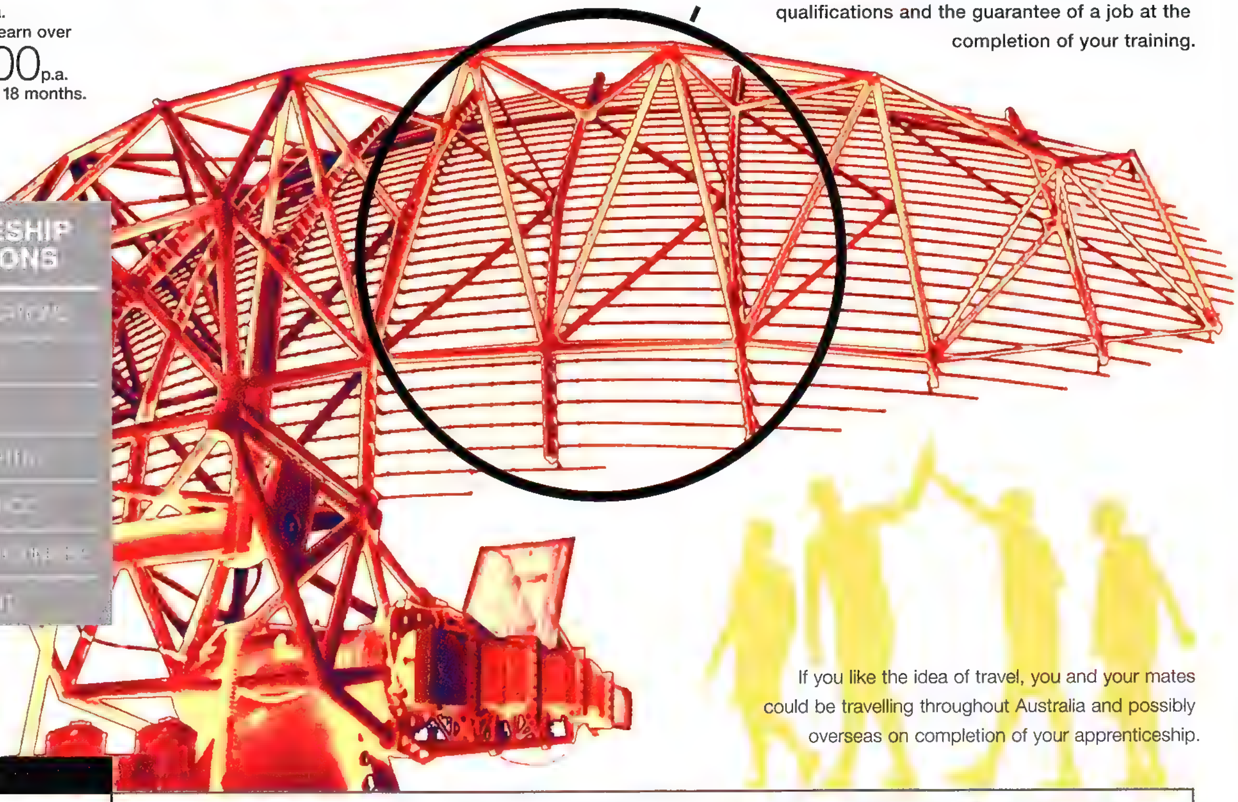

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Simple answer to a complex problem

Tim Dean thinks things should be as complex as necessary, and as simple as possible.

I would like to talk about a complex problem: the problem of complexity. A quick spin through Google's 'define' function reveals a number of illuminating definitions. According to computer science, complexity is a measure of how long a problem takes to solve. Complexity could also be the interaction of many parts or variables. It can also mean non-linearity, or possibly even refer to the observation that underlies Chaos theory – that small variations in cause can result in large variations in effect.

Now, what about simplicity? Well, if we take simplicity to be the opposite of complexity, then it's simply the interaction of a few parts or variables. It could also describe a linear problem, or one that takes little time to solve.

OK, now I think we have a fairly good understanding of complexity – so why is it, then, that this simple concept seems to have totally eluded some of the best brains in the games industry?

Over the last few years, there has been a strong shift towards the mainstream in gaming. This shift has been in part due to the pressure publishers put on developers to make sure their game will sell to the broadest possible market.

Another reason has been the influence of consoles on gaming. The console market is perceived to be less interested in traditionally 'complex' PC type games, and more interested in games that are easy to get into, and this bleeds into games that are developed across multiple platforms – they always stick to the dastardly lowest common denominator.

My problem is this has resulted in a 'dumbing down' of games that have recently been released on PC, but I don't want to cop out by just calling it a 'dumbing down', I want to really try and understand what this means, and what's causing it. That's why I'm talking about complexity. I think the problem is games developers are making the mistake of confounding different types of complexity, and 'dumbing down' the wrong things.

I can totally understand the desire to keep a game easy to play. An interface that is overly 'complex' can make a game less fun to play. If it takes four clicks to do something that should take only one or two, then things can get frustrating. I can also understand the desire to not overwhelm the player with too many options at any one time. They need to be subtly directed while still maintaining the impression of self determination.

Given this, I think games developers have been mistaking a desire for simplicity on the surface for simplicity underneath. By making things 'accessible', they've forgotten that it can often be complexity that makes a game fun.

> Games developers are making the mistake of confounding different types of complexity, and 'dumbing down' the wrong things.

Let's look at chess, one of history's most popular games. Chess has relatively few rules (I just counted 30, although I might have missed some) to define how the game is played end to end. Yet the number of possible games numbers into the hundreds of billions.

This is a perfect example of a complex game – a small number of variables can result in a large number of outcomes. It doesn't take long to learn how to play, but it can take a lifetime to master.

When it comes to computer games, I feel there's been a move away from this model towards one where not only are the rules simple, but the mechanics are simple as well.

For example, compare Freelancer to X2: The Threat. Now, I can totally understand why Digital Anvil made the flight controls in Freelancer mouse-based, but the thing that perplexes me is the decision to make the prices of all commodities around the universe fixed. In X2, you really have a dynamic economy. If you build a factory and produce huge numbers of one product, demand drops, and so does the price. It's the complexity of a dynamic economy that makes trading games fun.

As a counterpoint, though, I will fully acknowledge that the interface to X2 is diabolically complex, and this is the reason the game is no longer in my regular rotation. Unfortunately, it's games like X2 that give complexity a bad name, and encourage more flat, homogenous and ultimately unrewarding games like Freelancer (I'm being harsh, I know, but hearken back to Elite and Privateer, and you'll know what I'm talking about).

So, let's take what is in my opinion the perfect example of a game that has effectively balanced complexity with simplicity in all the right places: the Gran Turismo series.

On the surface you have fairly basic controls, and a good number of cars and options, but not so many that it becomes overwhelming. But under the hood is a complex physics engine, AI and a multitude of options and upgrades for all your cars.

In fact, many will say it's the acquiring and modifying of cars that is the best and funnest part of the game, not just the winning of races. So the Gran Turismo series is: easy to play, hard to master, complex under the hood, and a bloody big seller.

So, what I'd like to see is a rethinking of the way games are made that brings gameplay to the forefront once again. Yes, interfaces should be simple, but let gameplay be complex in the right way, and you get much richer rewards than something that's as shallow underneath as it is on the surface.

I'd like to see developers stick two quotes on the walls of their offices. In the game design department they should have Einstein's quote: "Things should be made as simple as possible, but not any simpler." And in the interface department, they should target Goethe's consideration that "everything is simpler than you think and at the same time more complex than you imagine."

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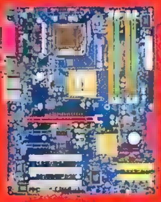

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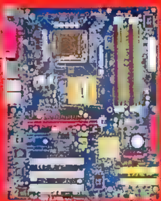

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Over time the number of devices vying for the scant number of inputs on a television has skyrocketed. With DVDs, VCRs, consoles and PCs, an AV switch can make life a lot easier than it once was. Joytech's solution is stylish, simple and has a remote. This is damn cool. Unfortunately PC video output can have some auto detection problems when running through it, but apart from that this is a handy, if somewhat pricey, solution to the pain of reaching behind your TV to shuffle cords.

2 Logitech MX510 mouse

Supplier: Logitech
Website: www.logitech.com
Phone: (02) 9972 3711 **Price:** $99.95

Few technorodents come close to the performance of Logitech's MX500 mouse. It has rocked our worlds since its launch last year and now Logitech has set its sights firmly on gamers and has released the updated MX510 model. This comes with a higher resolution optical sensor, a higher sample rate and a sexy Red shell. The verdict? Its fantastic, but the MX500 is so damn good it's nearly impossible to discern any performance difference between the two.

3 Slim Devices Squeezebox

Supplier: PC Case Gear
Website: www.pccasegear.com.au
Phone: (03) 9584 7266 **Price:** $495

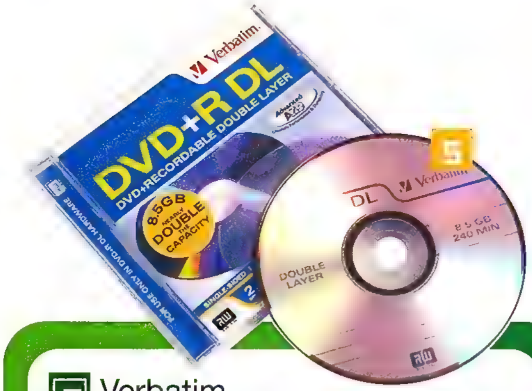
Designed to stream audio wirelessly from your PC or file server direct to your stereo, the Squeezebox is a funky little accessory, if somewhat pricey. The hardware box has analog and digital outputs and interfaces with server software on your PC, all controlled by remote.

Heck, it even rebroadcasts internet radio stations. It's fun, and it is special; just remember that there are more and more devices like this on the market everyday.

4 i-Cute Jet

Supplier: PC Case Gear
Website: www.pccasegear.com.au
Phone: (03) 9584 7266 **Price:** $199

Equipped with a front 120mm fan, this PSU-less case is a mean looker (although a little plasticy up front). Internally, the design is up on modern times with a removable motherboard tray and five modular-designed slots for screwless HDD slottage goodness. Several small niggles such as the front door which comes off a little too easily and the location of the front fan speed dial a tad too close to the edge. However if you can ignore the weighty steel, with decent airflow it isn't a bad case.



5 Verbatim DVD+R DL

Supplier: Verbatim
Website: www.verbatim.com.au
Phone: (03) 9823 0999 **Price:** $14.95

No matter how cool your new dual layer DVD burner is, without the right media you can't cram that promised 8.5GB worth of data onto a disc, overburning or not. Dual Layer media is as rare as the proverbial chicken fangs, but Verbatim has its product ready to roll. Formatting down to 7.96GB, this sucker shows the disparity between actual gigabytes and marketing gigabytes still exists, but still holds a cubic arseload of data.

6 MSI Mega Cache 15

Supplier: MSI
Website: www.msicomputer.com.au
Phone: (02) 9748 0070 **Price:** TBA

While flash based USB storage devices have quickly entrenched themselves as the perfect portable storage medium, actual capacities are still quite low. Obviously the MSI scienticians have been beavering away on this problem and they have come up with the Mega Cache. This little box eschews flash memory in favour of a one inch 1.5GB mini hard disk, for some serious USB 2.0 based storage capacity. The swivel mounted USB connector allows for maximum flexibility.

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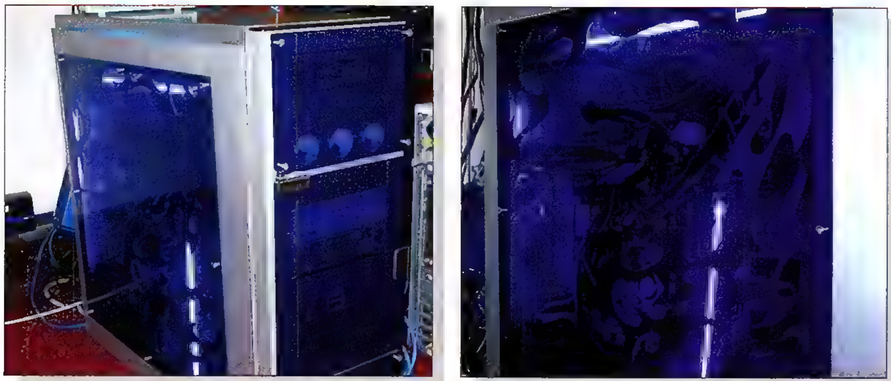


Technical details

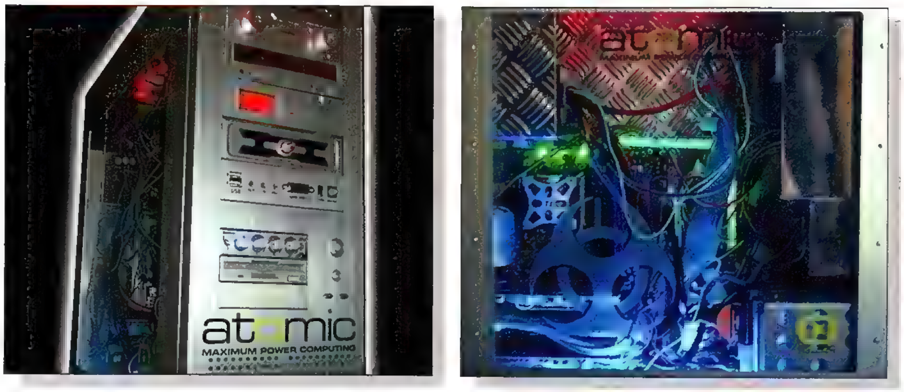
- AMD Athlon XP 3200+
- Gigabyte GA-7NNXP
- 512MB PC3500 DDR CAS2
- 893GB total HDD space
- Albatron Geforce4 Ti4800V
- Sound Blaster Audigy 2 ZS
- Swiftech water cooling setup
- Two 480W PSUs
- Took about 10 hours to complete

At first I was a little afraid to attempt a mod on my Lian Li PC70 tower case but after the success of modding my old Lian Li PC60 I went ahead and found a window design I liked and changed it to suit the size of the case. I used an Air Body saw, which is a pencil-like jigsaw, to cut the very intricate window design. Then, adding in the blue acrylic window and front door panel, my case mod was almost complete. I'm starting the process of building a water-cooling reservoir down the back of the case but it's still in the design stages.

Due to the server nature of my computer it's very heavy to carry around, so a hidden set of caster wheels are also fitted to the bottom of the case.

Also the addition of two 480W PSUs has allowed me to add a 130W Peltier into my water cooling setup and still run all eight hard drives. All-in-all, this case took a total of 10 hours work to complete.

Antone's Generation X



Technical details

- Intel Pentium 4 3.0GHz @ 3.5GHz
- Two 512MB Geil 3200 DDR RAM
- ABIT IC7 MAX3 motherboard
- ATI RADEON 9800XT 256MB
- Maxtor 200GB 8MB cache
- Maxtor 80GB
- Thermaltake 480W PSU
- Pioneer 107D DVD burner
- Sound Blaster Audigy 2
- Thermaltake Spark 7+ CPU HSF
- Lian Li PC-75 case
- Lian Li multimedia bay
- Digital dock fan controller

Well, I started with hardly anything in the huge phat case and it gave me the idea to stuff more devices into it, to fill it up.

Most of my income was put into the development of this masterpiece. I've done quite a few easy mods to this case – there's the chequered plate, which I stuck on the inside and I've painted a few of the fans silver (looks aluminium) and the drive face plates. w00t!

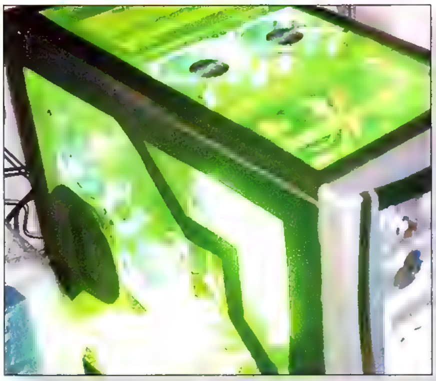
Plus there's a few fancy-looking controllers on the front. The blue cold cathode, green bubble lights, EL glow wire, and the LED fans, light the inside of this tower to make it the king of LAN parties.

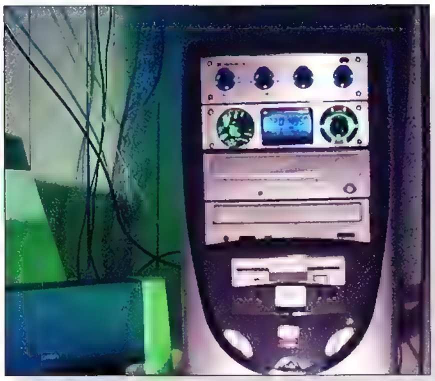
The top of the Lian Li cases are plain so I cut out holes, put three LED fans in and whacked some mad laser cut grills over them. And they look great.

As you can see from the few stickers on the case... I really do love Atomic!

I am not a vegetarian because I love animals. I am a vegetarian because I hate plants.

DRAGO's Reactor Box





Technical details

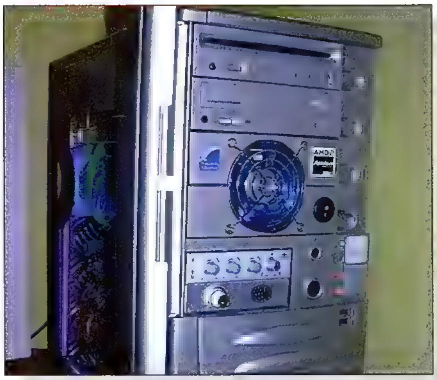
- AMD Barton core 2500+ @ 2700+
- Asrock K7VM4 (which is no good at all for overclocking)
- 512MB RAM
- 20GB Quantum Fireball
- GeForce4 MX440SE 64MB
- Alpha case
- Aerogate 1 and 2 fan controller
- LG 52x/32x/52x burner
- 52x CD-ROM drive

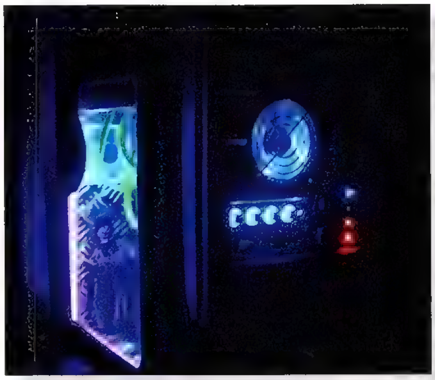
I was in desperate need of better cooling for my system, and so started on DRAGO's Reactor which had 10 fans in total. It sounds like I'm in a plane... temperatures that were as high as 60° went all the way down to 35° – which was very sweet. The design is completely random except for the partial AMD logo on the top right and it was all cut by tin snips as I had a lack of tools and a jigsaw for the perspex plastic. But they got the job done.

I had to purchase an Aerogate 1 and an Aerogate 2 fan controller with five neon green fans and two green neon lights. The clear green perspex I got free from my school, and anything free is good.

The custom-made North Bridge fan cooler is really effective and so is the custom control front panel which fits in the unused floppy drive bay and can turn off all fans, lights and the top HDD LED flasher.

WuZ's LAN Boxen





Technical details

- Antec LANBOY with 350W Smartblue
- Asus A7N8X Deluxe
- Athlon XP 2500+ @ 3200+
- 1024MB Geil Value PC3200
- Albatron GeForce FX 5700U3 (DDR3)
- Seagate 40GB IDE
- Western Digital 120GB IDE
- Two Samsung 160GB SATA
- Lite-On 32x/12x/40x
- Pioneer 106S slot-loading DVD
- Vantec fan & light controller controlling three Vantec spectrum fans and two UV CCFLs
- Cooler Master Aero 7+

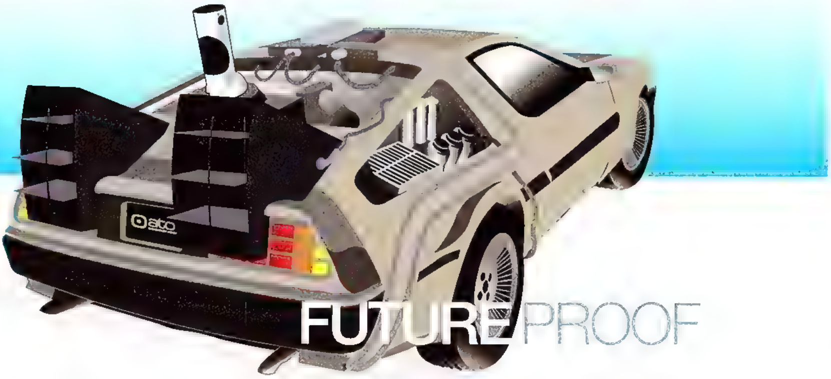
Got the LANBOY late last year, decided to give UV innards a go – green UV cable sleeving on all power cables and three Vantec Spectrum UV LED fans. I didn't like the bare metal surface so I bought some plastic chequered plate from Supercheap Auto and used double-sided tape to stick it to the inside. :)

My main aim with this case was to keep my HDDs cool. So I decided to cut a fan hole out of the two spare 5.25in bay covers and cool two HDDs (IDE drives) there, and screwed a spare drive cage to the base of the case in front of the intake fan. HDD heat problem solved. To add a nice touch, I replaced the standard LEDs with ultrabrights – blue for power, green for HDD activity – the spare two, which are red, are wired up to the front and rear fan, so when they are spinning the red lights are lit up.

Hotbox of the month wins the Leadtek Winfast K7 NCR18D!

Vote for this month's hottest Hotbox at www.atomicmpc.com.au. Voting closes 21/07/2004. Send your Hotbox pics and 200-word description to *hotbox@atomicmpc.com.au.*

- Leadtek Winfast K7 NCR18D
- nForce2 Ultra 400



No eXcuse

AMD and Intel are closing the door on buffer busters. Logan Booker divulges the details of NX.

The last thing you'd expect to come out of the latest wave of viruses, trojans and worms is announcements from CPU makers AMD and Intel that they will be including a new CPU flag, called No eXecute (NX), in their processors to help stifle the more virulent of these infections.

It's unexpected because short of dedicated security boxes from vendors such as Symantec, Netgear and Cisco, there's not much in the way of hardware to protect a computer from viruses. It's always been a software-only market, filled with the likes of McAfee and TrendMicro. Not odd, considering viruses are a software problem – as are the programs containing the vulnerabilities they exploit.

The particular vulnerability NX protects against is the buffer overrun.

Most viruses, in order to function at their best, need to be able to execute code unchecked. This means – on a Windows machine at least – they need 'administrator' privileges, which provides them with complete access to all system-critical processes and files. This is where buffer exploits come in.

Many of the applications we use today are a little lazy when it comes to checking the size of the data they receive. This isn't a problem if the program is a word processor or a game, as their interaction with core operating system components is minimal. However, core OS services that run constantly in the background need to be as airtight as possible. Until recently, this wasn't the case with Microsoft's 2000 and XP series of operating systems, and even though a lot of work has been done to make them more secure, vulnerabilities still exist.

By 'injecting' oversized data into a buffer, the buffer can overflow overwriting code in subsequent memory locations and, in its place, a virus can execute code it otherwise wouldn't be able to. If this buffer is part of a core OS service, chances are it has administrator access in order to run. So it doesn't matter what access rights the current user has, the virus will hijack the privileges used by the core service. From there, it can 'loop back' to the virus code, and go bananas on your box. The user sees a program crash error message and are none the wiser.

Come Microsoft's Service Pack 2 for Windows XP, and the adoption of CPUs supporting NX, this situation will change. According to Microsoft's Security website 'Execution protection (also known as NX, or no execute) prevents code execution from data pages such as the default heap, various stacks, and memory pools.'

Basically, parts of memory are 'marked' as executable or non-executable. Code that tries to run in a non-executable part of memory will fail, as is the case with all buffer exploit-based viruses such as Blaster, and more recently, Sasser.

No Execute has the benefit of making programmers 'better': 'Microsoft is supporting emerging processors that incorporate execution protection by making additions to Windows, beginning with Microsoft Windows XP Service Pack 2. Execution protection has obvious advantages concerning buffer overrun exploits and promoting general good coding practices for Microsoft and third-party developers.' Which is nice, considering buffer exploits are the result of lazy programming habits anyway.

'Emerging processors' include AMD's Athlon 64, Intel's Pentium 4 and Transmeta's Efficeon line of mobile CPUs. The important thing to note is even if you do have a processor with NX support, it needs to be running on an OS that supports it as well.

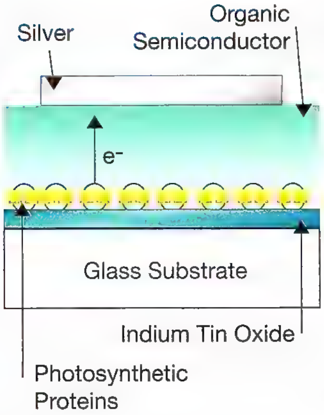
Windows XP, post-SP2, will allow the user to turn NX support on and off. Some programs, specifically Java applications that make use of 'just-in-time' code compilation, won't run correctly in an NX-enabled environment. Many legitimate Java apps use JIT. Fortunately, Microsoft has provided an 'exclusion' list so you choose which programs run with execution protection. Interestingly, Microsoft .NET applications execute code in data areas as part of their normal operation, and in order to remedy this, Windows XP SP2 will disable execution protection when .NET programs are run. It's a little bizarre, considering there are viruses in the wild that run under .NET.

Windows 64-bit will support execution protection natively, and will not have an on/off function. All programs will run in a 'secure' environment, so programmers using .NET, and indeed any coding language, will need to keep an eye on their programming habits. At the moment, Microsoft has been reactive, rather than proactive, about securing its operating systems and applications. Supporting NX is the first proactive step Microsoft has taken in some time; yet, it's a small step, considering execution protection has been supported by operating systems such as Linux for years.

ABOVE: No eXecute works only on certain CPUs like the Athlon 64.

Keep in mind that NX is a partial solution – it cannot and will not replace a virus scanner or good user habits. It doesn't stop all viruses, and some viruses can still be as effective regardless of what environment they are running in.

Unfortunately, by the time NX is adopted by a majority of users, virus writers will have discovered a new way to infect our systems. LB



ABOVE: Imagine running your house's electricity off a spinach farm. You know you want to.

Bizarre biotech

Sometimes truth really is stranger than fiction, as Nathan Davis observes.

The idea of humans powering devices or having data pumped through them direct has been flung around for a while. The Matrix certainly pushed this idea to the general public, though probably in not such a positive way.

Well this year, on 22 June, something very bizarre occurred. Someone issued a patent no one saw coming. US Patent number 6,754,472, in fact. It is titled 'Method and apparatus for transmitting power and data using the human body' and if that isn't crazy enough, Microsoft own the rights to it. That's right, Microsoft have a patent on using your very own body as a conducting medium. For some reason 'Borg' springs to mind.

Quite simply, Redmond now lays claim to your body's conductive capacitance. Why would they be interested in such a thing? Our bodies, by default, conduct electricity. Our brains are full of electrochemical, data-flowing goodness. Our nervous system is a massive internal network of biological, powered data pipes. It's a medium just begging for some cyber-integrated, *body powered*, devices.

Unfortunately, by patenting the seemingly unpatentable, Microsoft has at least cut off other prospective inventors from even considering playing around with using the human body as a means of power or data transfer for connecting devices. Then again, there are probably some ways around this.

For example creating electricity from body heat is an exciting area and a company called Biophan Technologies are already working on a *biothermal battery*. With pacemakers in mind, their ultimate dream is to create a battery that doesn't require replacing for 30 years. This battery is connected to masses of tiny thermoelectric generators – which are attached throughout the body, millimetres from the surface of the skin – which produce electricity using the thermocouple effect. This is the creation of electricity as a result of two different metals sitting at different temperatures which are connected via a junction.

Currently, the problem with this is the amount of electricity generated. It isn't a great deal – we're talking microvolts. Thousands of thermoelectric generators are required to create a decent amount of juice. At present, Biophan is working on a battery that they hope will generate a decent 4 volts at 100 microwatts. That's definitely useful, and could even eliminate the need for a battery.

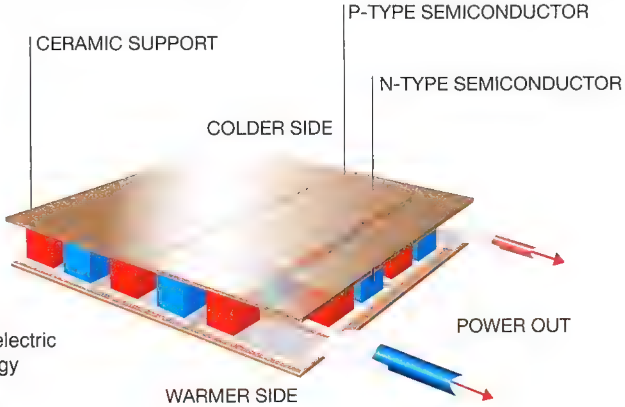
Apart from the human body, there are other exciting happenings in the world of biotech. Scientists are now looking at using spinach as a power source for creating electricity. Yep. That stinky green slop you leave on the side of the dinner plate is now useful for something – actually, they have to still be alive. Dang.

In the actual cells of green leafy plants, particularly spinach, are structures known as *photosynthetic reaction centres*. As a result of absorbing sunlight and converting it to chemical form, these reaction centres generate very small voltages – a neat side effect of photosynthesis.

Why plants? It only takes five trillionths of a second to turn sunlight into electricity. This is approximately one hundred times faster than a silicon solar cell. They chose spinach because, interestingly enough, the leaves are supple enough to easily separate the reaction centres from the leaf.

Then there's the field of *synthetic biology* where scientists are playing around with viruses, hoping to successfully create programmable genetic 'machines' not unlike the concept of nanobots, only these nanobots would be biological in nature.

Though the science of silicon has long guided us in our pursuit of technology, biotech is going to become increasingly more mainstream as the era of bio-powered devices becomes a day-to-day reality. ND



RIGHT: This thermoelectric module creates energy from body heat.

Geeks in space

What in the world does a billionaire computer entrepreneur spend pocket money on? A ticket off it, according to Ben 'take me with you' Mansill.

id Software's John Carmack, Microsoft's Paul Allen and the people's Sir Richard Branson share much in common. Helping found companies without precedent, they played pivotal roles in forging paths into the unknown and succeeding spectacularly.

Now rich beyond imagination, these lads indulge in pastimes in keeping with their character. An unashamed Trekkie and UFO buff, Allen has thrown vast sums at the SETI project, and the $22-million Sci Fi museum in Seattle is his baby.

Branson is the extreme record breakers' poster-boy. With escapades like crossing the Atlantic in a powerboat, breaking the speed record, and balloon quests with buddy Steve Fossett, Branson's the playboy daredevil personified. Carmack has simpler tastes. He likes to do quarter-mile runs in Ferraris, which have as much power as F1 cars.

Clearly, these boys have common goals. While Carmack and Allen may not have Branson's exuberant personality, all are driven to push technological boundaries and be *the first* in esoteric spaces. It would be a surprise, then, if they – and others like them, were *not* compelled to join the race known as the Ansari X Prize.

What the hey?

X Prize is a privately funded competition, with an award of US$10,000,000 to the first team that launches a passenger craft into space. The rules are: the craft must carry one pilot and two passengers; reach the altitude that is technically defined as 'space', being 100km; and repeat it within two weeks.

In 1994 businessmen Gregg E. Maryniak and Peter H. Diamandis had an idea to raise the cash for this endeavour. Inspired by previous aviation competitions, particularly the Atlantic crossing, which Charles Lindberg won, Marynia and Diamandis saw the idea as a way to stimulate private space ventures.

Their shared dream was to travel into space, and they saw the competition as a way of making that dream a reality. Perfectly willing to pay for the privilege, they figured that without an incentive, the chances of privately developed space travel getting off the ground were minimal.

Issuing an open invitation, they asked for donations of US$25,000 from other wealthy and spacey individuals, aiming to sign up 100 'partners', to cover the cost of the prize and ensure its administration and promotion. The cash rolled in. Now, they have over 60 partners signed up, guaranteeing that X Prize is a sure thing for the 2005 deadline – and possibly passed that.

The partners X Prize has attracted include Richard Garriott – Lord British himself and the creator of the Ultima series of games – among others. Garriott is also a member of the X Prize Board of Trustees, a nice hobby indeed for an eccentric genius.

While there is no established deadline for eligibility to win, the guarantee of a prize only extends to January 1st, 2005, which shouldn't be a problem as at least one team looks certain to win the Prize by that date.

The players

Over 20 teams have 'entered' the race. Many clearly have no hope, and are simply science/rocketry enthusiasts having a good time with investor dollars. Almost all teams have a scale prototype as proof of concept. It's highly unlikely these teams will progress beyond this stage, and it's improbable they intend to.

While the cost is high, the technical challenge is relatively straightforward. Off-the shelf rocket engines are plentiful, tried and tested. The challenge for designers is in integration and fuel systems, with the main hurdle being aerodynamics and control systems.

Our superstar entrants are tackling it in perfect character, Carmack is doing it himself from scratch, learning and developing new technologies as he goes, while Allen is throwing cash at the tried and tested experts. Not that Allen's approach is dishonourable – far from it. Allen's pragmatic style is most likely to succeed – indeed, one feels Carmack is doing this purely as an outlet for his scientific passion alone.

Allen is the major investor in Scaled Composite's SpaceShipOne, developed by aviation legend Burt Rutan. Developed in secrecy and revealed to a stunned world only when completed, Rutan's ship is typical of the designer, featuring a mothership of radical aeronautical design, and a passenger ship as close as you could dream of being a true personal rocket craft.

The smart money is on Scaled as the best chance, indeed, Carmack as good as conceded, saying: 'I hope Burt has everything worked out and he is able to make the X Prize flights soon, because our prospects are pretty dim for getting everything working perfectly… if SpaceShipOne crashes, we will probably throw ourselves at an attempt, but it will be a long shot. No, I don't think any of the other teams are close.'

How high is the sky?

Space is officially set at 100 kilometres. At that altitude there is near enough to zero gravity and no atmosphere to cause aerodynamic drag. The curvature of the Earth is clearly visible and it's space-black.

Russian Yuri Gagarin, the man officially acknowledged as being first in space, reached an altitude of 203 miles (326 kilometres) and orbited the Earth once. American Alan Shepherd, America's first, made his suborbital ballistic lob and reached 116 miles (186 kilometres) high, and he came straight back down 302 miles (486 kilometres) from his launch point.

SpaceShipOne flights will take off and land from the same runway, and be around an hour in duration – of which only 3-4 minutes will be spent in 'space'. Yes, you'll be weightless, but it's not likely you'll be unstrapping your harnesses to enjoy it.

Make do with spinning a pen in front of you instead.

Thrill seekers

It's all positive though, as X Prize has stimulated applied interest in advanced large-scale amateur rocketry, helping cultivate future Von Braun's for the private industries of tomorrow.

A few levels of credibility beneath these advanced hobbyists are a few unmistakable loonies. 'Blastwave-Pulsejets' have proposed a giant flying saucer, with a fuzzy sketch as the only source of reference data. 'PanAero' wants to attach a rocket motor to a conventional Sabre 40 executive jet. They plan to fly it to maximum altitude using its regular jet turbine engines, then ignite the rocket and point it straight up, into space.

This last concept isn't so crazy, although the use of a passenger jet is questionable aerospace engineering. In fact, the team most likely to succeed uses a very similar approach.

Most entrants have opted for the traditional ballistic rocket, and most of those have just one stage. This is better for recovery and re-use, simplicity of engineering, and that the low altitude required lets them get by with just one stage.

But that doesn't mean they aren't using novel means to launch. Two entries will carry their rocket, suspended under a balloon, to about 32,000 feet, then drop the rocket so its engines ignite. This gives the rocket a nice fuel and weight saving head-start. Another will tether their rocket underwater, using the buoyancy as a natural launch-assist.

Surprisingly, there is only one Russian entrant. Suborbital Corporation's Cosmopolis is the same in concept as Scaled's SpaceShipOne, but uses an existing M55 transport plane as the mothership, instead of a custom vehicle.

Extreme poverty can't be an excuse for the lack of Russian involvement, because third-world Romania has managed to field a serious entry.

Tickets please

Needless to say, almost all serious attempts will be spending far more than the potential $10,000,000 prize, but win or lose, there is scope for payback. Even if SpaceShipOne takes the prize, it's expected that several remaining teams will press on. Forgoing a $10,000,000 bonus may turn out to be meaningless if a cheap and reliable launch vehicle can be developed – the 'space tourism' market beckons.

As mentioned earlier, the standard design spec for an X Prize vehicle calls for two passengers and a two week turnaround between launches. Even if ticket prices are $10,000+, the queues will stretch around the block. Ten grand will buy you 30 minutes in a Russian MiG-25, it would have bought you a ride in the Concorde, and many hundreds of extreme sports types, show-off ponytails, genuine tech and space fans, and just plain ordinary people are ready and waiting to live the ultimate dream of riding a rocket into space. Who wouldn't put a new car on hold for that?

For $20,000,000 the Russians will take you up in a Soyuz and put you in the International Space Station for a few days. An X Prize ride is, at best, an hour of ballistic lob and a few minutes of zero-G, but whether you're after boasting rights or the adrenalin experience, it's clearly a value proposition!

The commercial satellite market is the next logical step for teams with proven technology. Take the size and weight of a three-person capsule out of the equation, and you have yourself a vehicle that should easily be able to place a micro satellite (or a cluster of them) of a few dozen kilos into orbit.

The launch site becomes a critical factor though. Any old patch of desert or coastline is no longer sufficient. These lightweight rockets will need all the help they can get to reach orbit, and that means being as close to the equator as possible – the Earth's rotation provides a tidy free boost to the lob, and for this it doesn't get any better than the equator.

It's full of stars

That the prize will be won before the 2005 deadline seems assured. Less certain, but tantalisingly likely, is the prospect of commonplace private entry into space. We all know what happens when free enterprise gets its hands on a profitable idea! The technology is in place, the incentive is there and the will of a million people to live their most cherished dream is as desperate as it's ever been.

So next time you are lamenting the lateness of id Software's new game, or bugs in Microsoft products, or even the decay of Britannia – gaze skywards at night, for that's where the action is really taking place.

Entry void

Despite the immense complexity of the task facing serious entrants, the rules of the contest are tantalisingly simple:

- Launch a piloted, privately-funded spaceship, able to carry three people to 100 kilometres (62.5 miles) altitude;
- Return safely to Earth and;
- Repeat the launch with the same ship within two weeks.

Of course, any entrant who flies anything will be subject to local laws or regulations that monitor such activities. Indeed, very few governments or aviation authorities actually have regulations in place for private spaceflight, being something so new. So far, none of the participants have encountered difficulties, with authorities bending over backwards to proudly take these rockets where they deserve to be. From launch to touchdown, no more than a few kilometres will be covered across the ground, but large unpopulated areas are sought. We've all seen 'when rockets go wrong' videos and amateur rocketry isn't the love child of insurance companies and the FAA (Federal Aviation Authority).

11 BIG FLAVOURS!

Passing the pipes

With a new range of PCI Express and AGP graphics cards on the market, John Gillooly dons his benchmarking pants to see how this new generation measures up.

'Tiger Woods doesn't win every day. We don't deny that ATI has a wonderful product and it took the performance lead from us. But if they think they're going to hold onto it, they're smoking something hallucinogenic.' – Jen Hsen Huang, NVIDIA CEO

It was a big hiccup in what had been one of the industry's biggest success stories. After years of total dominance of the graphics market, NVIDIA lost its lead thanks to a combination of outstanding DirectX 9.0 hardware from competitor ATI and an architectural gamble by NVIDIA called the GeForce FX.

With the recent unveiling of the new generation of hardware this huge gulf in performance closed remarkably, and just in time for the graphics giants. After years of waiting there are some huge games starting to appear, and all of them stress the programmable shading architectures to the maximum. The first two, Far Cry and Doom 3, are out now with Half Life 2 and more just around the corner. These games alone – some of the most anticipated in the history of gaming – are cause for an entire legion of gamers to upgrade their hardware, but which technologies and chipsets are going to deliver the goods?

Since the unveiling of Doom 3 during the 2001 Macworld Tokyo launch of the GeForce3, both the hardware and the gaming scene have changed dramatically. Games like Half-Life 2, Far Cry, S.T.A.L.K.E.R., Lord of the Rings: The Battle for Middle Earth and Vampire: Bloodlines are all looking to the future and using the advanced shading features of DirectX 9.0 to make for fast, smooth gameplay.

The combination of the recent introduction of NVIDIA's NV40 and ATI's R420 cores and the launch of PCI Express means that there has been a refresh of the entire line of graphics hardware, and there are some quite amazing performance gains to be seen.

Over recent issues *Atomic* has taken a look at the new architectures and the flagship products from both NVIDIA and ATI, but now that the products are entering the retail market it's time to put this new epitome of graphics technology through its paces and see just how it'll measure up to the demands of next generation gaming.

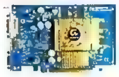
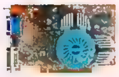
NVIDIA

While it will unveil new low and mid range cores later this year, currently NVIDIA has only launched high end products based upon its NV40 architecture – the GeForce 6800 Ultra, GeForce 6800 GT and GeForce 6800. Its other new cards, the GeForce PCX 5750, GeForce PCX 5300 and GeForce PCX 5900 are all GeForce FX cores paired with NVIDIA's HSI PCI Express bridging chip.

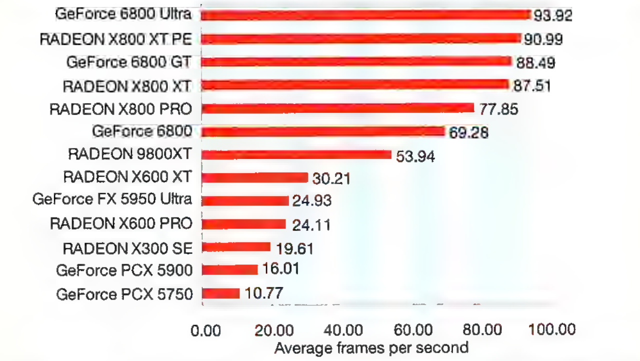
There are some very significant differences between these two lines of products. As we learnt over the past year, the GeForce FX has suffered from poor performance thanks to the way NVIDIA implemented Shader model 2.0 in the core. The GeForce 6 series is a completely new core, designed to support shader model 3.0, which brings new features onboard and eliminates the performance bottlenecks of the GeForce FX.

ATI

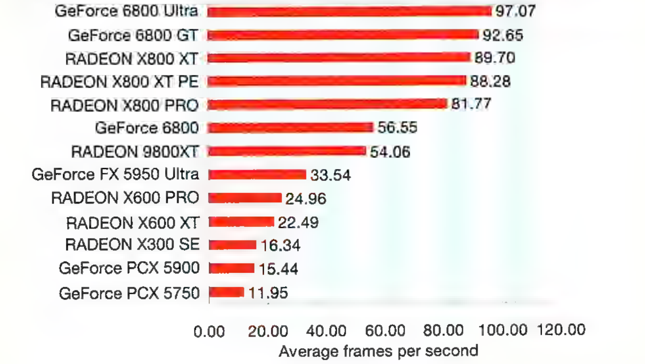
Rather than stroll down the Shader Model 3.0 route just yet, ATI instead opted to turbocharge its existing Shader Model 2.0 architecture. There are three cards in this range, the RADEON X800 XT Platinum Edition, RADEON X800 XT and RADEON X800 PRO. Rather than use a bridged solution, ATI has instead gone with two separate cores – one native AGP and one native PCI-E, although there is no discernable difference in performance at this time between the two solutions.

Chipset		Variant	Model & Supplier	Core speed	Effective memory speed	Memory size	Memory type	Shader model	No. of pixel pipeline
GeForce 6800 Ultra		AGP	Gigabyte GV-N68U256D Gigabyte (www.gigabyte.com.tw)	400MHz	1100MHz	256MB	256-bit GDDR3	3.0	16
GeForce 6800 GT		PCI-E	NVIDIA GeForce 6800 GT PCI-E reference card NVIDIA (www.nvidia.com)	350MHz	1000MHz	256MB	256-bit GDDR3	3.0	16
GeForce 6800		AGP	Expertvision GeForce 6800 Altech (www.altech.com.au)	350MHz	700MHz	256MB	256-bit GDDR	3.0	12
GeForce PCX 5900		PCI-E	Albatron PC5900 Albatron (www.albatron.com)	350MHz	550MHz	128MB	256-bit GDDR	2.0	4x2
GeForce PCX 5750		PCI-E	Albatron PC5750 Albatron (www.albatron.com)	425MHz	500MHz	128MB	128-bit GDDR	2.0	4x2
RADEON X800 XT		PCI-E	Powercolor RADEON X800XT PCI-E Powercolor (www.powercolor.com.tw)	500MHz	1000MHz	256MB	256-bit GDDR3	2.0	16
RADEON X800 XT PE		AGP	Powercolor RADEON X800XT Platinum Edition Powercolor (www.powercolor.com.tw)	350MHz	700MHz	256MB	256-bit GDDR	3.0	12
RADEON X800 PRO		AGP	Gigabyte GV-R80P256V Gigabyte (www.gigabyte.com.tw)	473MHz	890MHz	256MB	256-bit GDDR3	2.0	12
RADEON X600 XT		PCI-E	ABIT RX600 XT-PCIE Altech (www.altech.com.au)	500MHz	750MHz	128MB	256-bit GDDR	2.0	4
RADEON X600 PRO		PCI-E	ABIT RX600 Pro-256PCIE Altech (www.altech.com.au)	405MHz	500MHz	256MB	256-bit GDDR	2.0	4
RADEON X300 SE		PCI-E	ELSA FALCOX X30 SE Altech (www.altech.com.au)	325MHz	400Mhz	128MB	64-bit GDDR	2.0	4

Far Cry Bunker – 1280 x 1024



Far Cry Treehouse – 1280 x 1024



In the low range ATI has a suite of native PCI Express DirectX 9.0 solutions, all based off the same four pipeline architecture. The X600 comes in both XT and PRO versions and is similar to a 9600XT in features, while the X300 is the same core die shrunk to 0.11 microns but kept to lower performance thanks to a narrower memory bus.

Testing and performance

In order to get a true picture of performance for this new generation of hardware we've lined up 11 of the latest cards against each other in a variety of benchmarks.

Because the cards are a mix of AGP and PCI Express implementations we used two testbenches designed to be as equally matched as possible.

All tests were conducted with 3.4GHz Pentium 4 Extreme edition CPUs to minimise the effects of CPU limitation, especially in light of this new generation of video hardware. Our AGP setup made use of our standard ASUS P4P800 i865PE based reference board with 1GB of dual channel DDR400 while the PCI Express setup sported an i925x based ABIT AA8 Duramax board with 1GB of DDR2 533 memory. All other components were identical between the testbenches, with extensive testing revealing very similar performance between the two platforms.

Testing was performed using Windows XP with Service Pack 2 (SP2) RC2 installed, necessary because it contains DirectX 9.0c which is required to expose the Shader Model 3.0 features in the GeForce 6 series cards. This also meant that we had to test the NVIDIA cards with the non-WHQL 61.45 series ForceWare drivers, as the WHQL release of shader model

3.0 drivers will not come until SP2 is released to the public. The ATI cards were tested with the latest CATALYST 4.7 WHQL drivers.

For benchmark software we made use of 3DMark03 and AquaMark3 at standard settings, but for our game tests we made some small changes to our testing procedures to make them more forward looking.

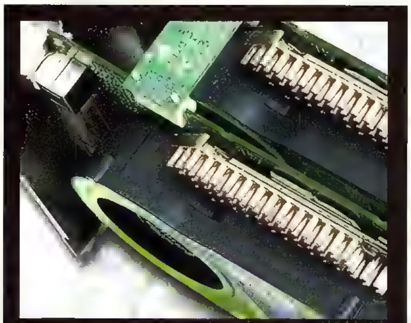
Far Cry is one of the most shader heavy games yet released, and with the arrival of the 1.2 patch it now also supports a Shader Model 3.0 rendering path. It's important to note that this patch does not offer an improvement in image quality or the introduction of features like displacement mapping, it is instead a simple performance upgrade. As you can see from our comparative testing boxout, the GeForce 6800 series cards benefit quite significantly from this.

Being *Atomic* we spent some time putting together some new and revealing demos for Far Cry. The first of these is on the single player level Bunker and is designed to test the indoor rendering performance, while the second is on the Treehouse level and tests an outdoor, vegetation heavy zone. We chose areas in which AI interaction is low to ensure that the performance is replicable and consistent across runs.

We also tested with the CPU limited Call of Duty, but tailored this to maximise image quality. To do this an arbitrary target framerate of 70fps was chosen and antialiasing and anisotropic filtering settings were tweaked until this framerate could still be consistently achieved. These tests were run at 1280 x 1024, being the most common resolution for users of CRT and LCD monitors alike.

Results and analysis

There are some clear trends emerging in the 3DMark03 tests, as we have seen in past issues, the X800 core is slightly quicker than the GeForce 6 in Shader Model 2.0



SLI moves

While NVIDIA announced last month that it was supporting dual video card solutions with its PCI-E versions of the GeForce 6800 Ultra and GT cards, actual benchmarks are non-existent. We expect testable hardware next issue, but for now all we have is a mythical 1.87x performance boost that NVIDIA touts in 3DMark03 and the current build of the unreleased Unreal Engine 3 from Epic.

SLI revolves around a custom algorithm to load balance between the two cards, so we would never expect a doubling of performance as operations like render to texture will need to be performed on both cards for a consistent image.

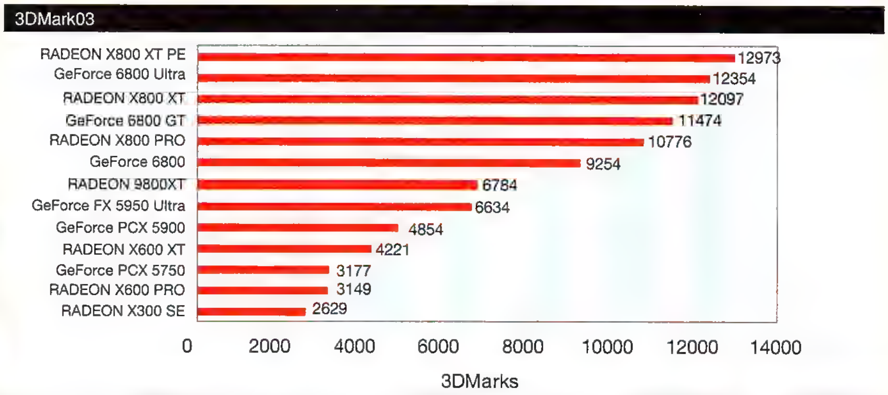
Both the benchmarks are from shader heavy titles, so we expect to see them thrive on the 32 SM 3.0 pipelines that an SLI solution would offer, but we doubt that huge leaps in performance will be seen in current titles, especially those that are CPU limited.

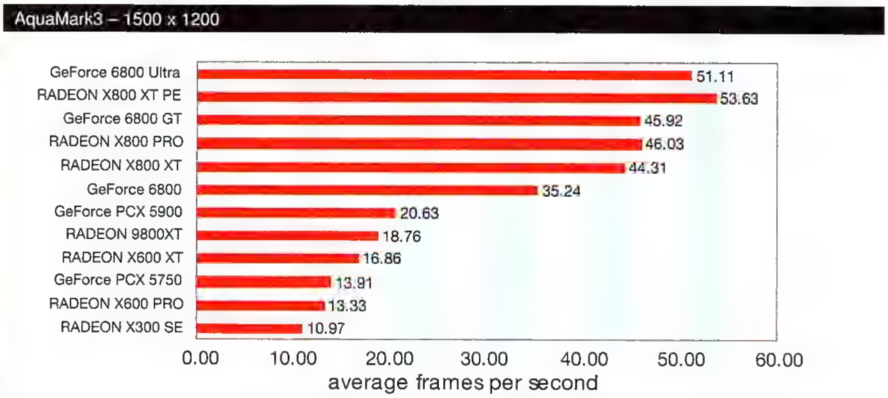
Card	Antialiasing	Anisotropic filtering	Average frames per second
GeForce 6800	2xQ	16x	72.7
RADEON X800 PRO	2x	16x	83.6
GeForce 6800 GT	4x	16x	81.9
RADEON X800 XT	4x	16x	78.9
GeForce 6800 Ultra	4x	16x	81.8
RADEON X800 XT PE	6x	16x	83.7

Call of Duty quality testing

A lot of the current generation of game titles are CPU-bound with the new generation of video hardware, which means that the graphics cards have anisotropic filtering and antialiasing performance to burn. Rather than just load down the card with maximum resolution and image quality, we have tested the six high end cards in Call of Duty to see how much image quality can be improved while still keeping performance above 70 frames per second.

The table above shows the results achieved in these tests. As you can see, the 16 pipeline cards all manage respectable numbers, even the 12 pipeline cards are still capable of quite high levels of antialiasing and anisotropic filtering.





applications. On the other hand, in the mid to low end we see a picture that doesn't pan out in further tests, with the GeForce PCX cards outperforming their ATI equivalents.

In AquaMark3 a similar picture emerges, with one exception. While it seems to perform correctly in other tests, the PCI-E X800 XT slows down in AquaMark3, being outperformed by the inferior X800 PRO. We re-ran this test numerous times but the card was consistently slower.

What becomes obvious in this test is that the X800 core scales better with resolution, with the X800 XT PE performing at a similar level to the 6800 Ultra at 1280 x 1024 and beating it at 1600 x 1200. In the low to mid range the X600XT and PCX 5900 cards shine, delivering quite respectable performance, even if it is significantly slower than the top end cards.

Our Far Cry testing gives us two big insights into how cards are going to perform in the new generation of games. The first indicator is that Far Cry thrives on massive parallelism, with the 16 pipeline cards out in front of the pack. The second is that merely rewriting the shaders to take advantage of the features in Shader Model 3.0 makes a big difference in performance.

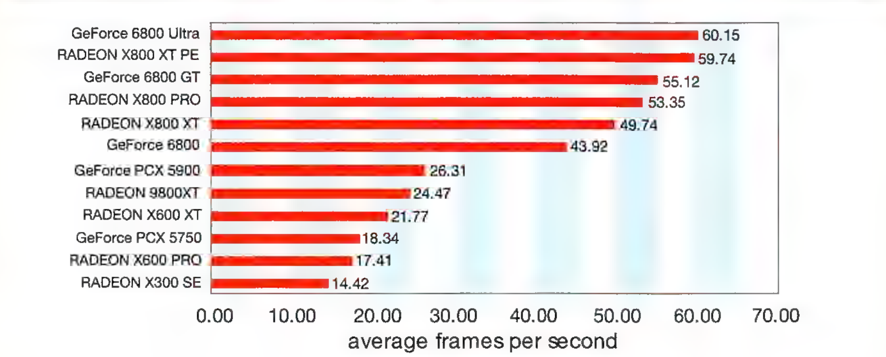
It is in this test that the GeForce 6800 GT really shines. The slightly lower clock speed makes it an average of 5 frames slower than its 6800 Ultra big brother in most tests, but in Far Cry it manages to beat the RADEON X800 XT cards in the outdoor areas thanks to the use of Geometry instancing for vegetation rendering, and it is only a couple of frames behind the X800 XT PE in the indoor levels.

Looking at the performance of the low end cards in Far Cry we can see the inferiority of the GeForce FX shading core highlighted. Even the supposedly crippled RADEON X300 SE with its 64-bit memory bus beats the GeForce PCX cards, while the X600 cards make a respectable showing against the GeForce 5950 Ultra. This comes down to the fact that both the X300 series and X600 series sport four pixel pipelines, and further highlights the importance of the shaders in the game.

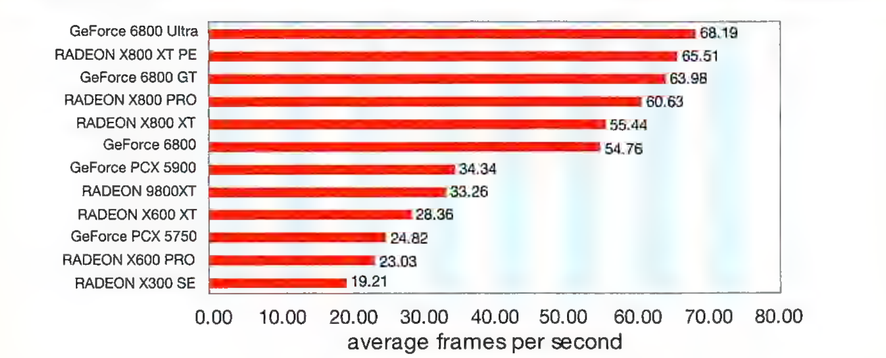
Conclusion

Throughout all our testing one high end card really stood out, the GeForce 6800 GT. With the GeForce 6800 Ultra both rarer and more expensive, the small difference in framerates is more than made up for by the fact that it sports a full 16 pipelines worth of Shader Model 3.0 power.

AquaMark3 - 1280 x 1024



AquaMark3 - 1024 x 768



Also working in the favour of the PCI-E variant of the 6800 GT is the fact that it supports the new SLI technology, which should become more of a reality once consumer chipsets start supporting dual PCI-E graphics slots.

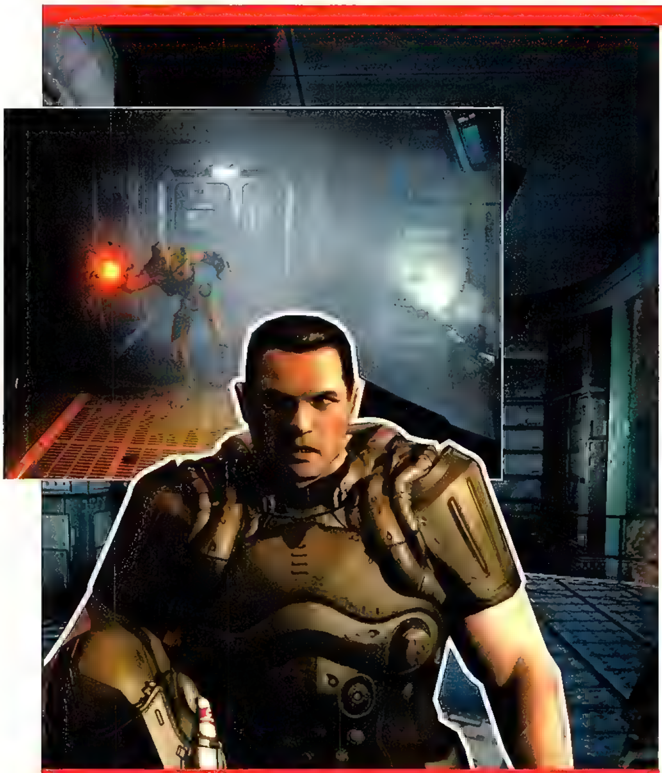
As we were going to press we obtained a copy of Doom 3 for testing , the results of which are on the next page. In Doom 3 a similar picture to our tests here emerge, with NVIDIA's cards definately benefiting from superior OpenGL drivers and Doom 3 specific hardware such as Ultrashadow.

This is not to say that the X800 is an inferior product. It still produces phenomenal gaming performance, and its Shader Model 2.0 architecture is very well supported by games in development. Where it will shine is in titles that support its 3Dc normal map compression, which should allow for higher quality images without hosing the framebuffer and hence crippling performance.

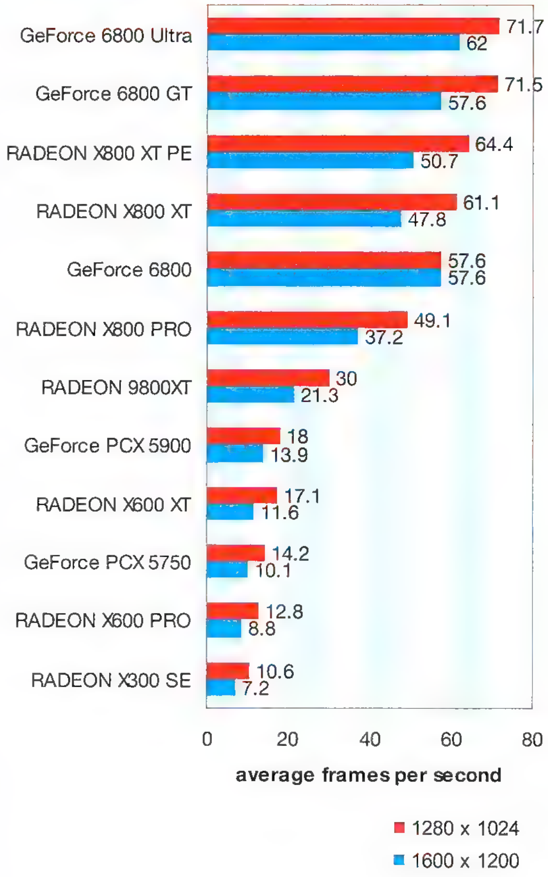
In the mid range the picture is much more difficult to ascertain. Certainly it seems that the RADEON X600 is the pick of the crop for now, as NVIDIA's mid to low end is populated with GeForce FX based hardware. This should hopefully change sometime in the next few months as NVIDIA brings four and eight pipeline variants of the GeForce 6 series to market, however both details and availability of these cards is currently unknown.

The real surprise package is the RADEON X300 SE, which outperforms the PCX cards in Far Cry. Despite the 64-bit memory bus, this is essentially a die-shrunk version of the X600 core so the four pipelines are still highly capable shaders. It also indicates why it was impossible for us to obtain a vanilla X300 card for this roundup, as we expect its performance to be quite close to that of the higher priced X600.

Overall the picture painted is a positive one for gamers of all types. With so many visually rich titles on the way, serious PC gamers will definitely want one of the high end 6800 or X800 series cards, but the mid to low range will still deliver decent performance. With NVIDIA finally starting to claw back the performance lead lost in the previous generation choice in the market has again returned, and gaming is going to look and play better than ever.



Doom 3 Demo1 High Quality



STOP PRESS!

Doom 3 benchmarks

It is hard to believe that since the 2001 unveiling of Doom 3 we have seen graphics hardware evolve through several generations, but all that time we have been waiting for Doom 3 to arrive and make us not just want, but *need* new 3D hardware. id Software's masterpiece is one of a handful of released games to use shaders extensively, and is as a compelling a reason as any to postpone your planned holidays and direct the cash to precious silicon instead.

Unlike 99 percent of games on the market, Doom 3 does not use DirectX for graphics rendering, instead relying on OpenGL 1.5. It is also one of the few games that hardware manufacturers have dedicated transistors in their hardware for, NVIDIA's Ultrashadow tech is now in its third generation, and this is almost purely intended to make Doom 3's lighting intensive engine run smoothly.

With Doom 3 such a huge factor in deciding which card is best, we have run the entire range of cards tested this month through the Demo1 grinder. We settled on using the built in demo for several reasons, most notable that its pre-release status means that the bad kind of driver optimisation is unlikely. But also because this time around id has recorded the demo to show off a graphically intensive section of the game, with lots of lighting heavy rooms and piles of enemies. This demo is definately a worse case scenario in terms of graphical loading.

When running timedemos in Doom 3 it is more important than ever to run the demo multiple times and junk the first result for each resolution. This is because the demo throws the player straight into an action sequence, and there are noticeable pauses the first time through as the shaders are loaded onto the card. Note this doesn't happen in-game because they appear to be precached when the level is loaded, but it's important to note when running benchmarks.

Our benchmarks used the same testbenches as the rest of this month's comparison, and we ran our tests using the High Quality settings in Doom 3. There is also an Ultra Quality setting but this uses no compressed textures whatsoever and is designed for the 512MB graphics cards that are expected to be released later this year. While there is definitely some quality and resolution tuning to be done to make the game playable on low end hardware, we're specifically looking for what card is best for the game, not how it will run on your existing hardware, so High Quality it is.

Further to this it is important to note that the game does scale incredibly well. On the lowest performing card, the X300 SE, it ran at a playable 40 frames per second with medium detail at 640 x 480. Which isn't the sexiest resolution, but all the funky lighting effects are still there and it still makes for some moody gaming action.

It's interesting to note from the general pattern of results that there's points at which the game hits hardware limitations. Both GeForce 6800 Ultra and GT cards perform the same at 1280 x 1024, and the standard GeForce 6800 and GT deliver the same framerate at 1600 x 1200.

As with the rest of our testing this month, while any of the six new generation cards will lap up Doom 3, it is the GeForce 6800 GT that provides the best balance of pricing and performance. Once you move into the mid and low range cards you will be balancing out quality and resolution settings in the pursuit of playability, but this is one title where the combination of NVIDIA focused development and superior OpenGL support makes the GeForce FX and PCX based cards appear to be better than they otherwise would be.

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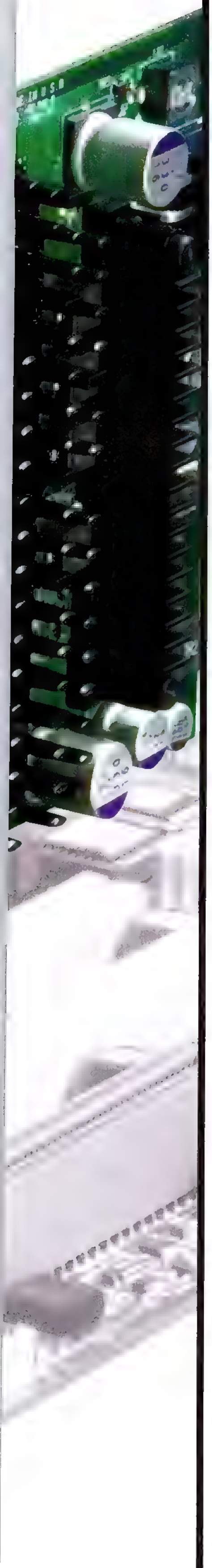
Parallel power

James Wang takes a look at the latent power in GPU technology, what it's brought us and where it's going to take us.



One could say that 3D graphics began at numerous points in history. However, if we had to list one, it would be the launch of GL Quake and Voodoo Graphics. Neither were firsts in the industry in what they featured, but together they solidified what was up until then a fragmented industry.

Prior to GL Quake the 3D industry, both software and hardware, had what we can now only envy – immense diversity. A dozen hardware vendors competed for the niche market of graphics accelerators. Almost every one of them was armed with their proprietary APIs designed for their chips. Games, developed in close association with hardware vendors, ran on some but not others. There were no standards and hence little restrictions. Polygons, quadratic surfaces, and voxels fought for supremacy in 3D programming while even more exotic hardware solutions battled to become the industry standard. Innovation seemed to occur at a daily rate, but it was anarchy.

Inevitably, there's room for only one programming standard and one hardware solution to complement it. GL Quake, for better or worse brought us that. So polygons became the modelling primitive, rasterisation the rendering algorithm and texturing became the hardware's primary job. Back then, GL Quake and Voodoo Graphics meant 3D. From there the divergent paths slowly disappeared and the ship sailed straight to where we are today.

From Voodoo 1 to GeForce 6

Since the path was laid down eight years ago, there's been very little fundamental change in industry. All new features in graphics engines and graphics chips are essentially incremental improvements to aid the rasterisation algorithm. Even innovations like NVIDIA's SLI are, while tantalising in terms of raw performance, simply a means to do more of the same only faster.

From the first Voodoo to today, there are two broad stages of hardware development. In the first phase came the proliferation of hardware features. These were silicon implementations of graphics effects. The simplest of these is multitexturing, where multiple textures are combined in real time for graphical effects such as shadows and bumpmapping. 3dfx's Voodoo and NVIDIA's TNT series popularised this technique.

More sophisticated hardware features were desired as games wanted to achieve unique visual appearance. Environmental bumpmapping, motion blur and dot3 bump mapping became buzzwords in the following years. With these more specific features, hardware support became more fragmented, with each vendor pushing their own features and the need for graphical APIs emerged. DirectX was already a major force in 3D graphics but could not harmonise the divergent feature sets of the different hardware vendors. Many developers at this time also longed for more flexibility which eventually brought about the next phase – programmable hardware.

In a sense, the move from fixed function to programmable hardware was a RISC manoeuvre; the implementation of graphical effects migrated from hardware to software. Instead of having a dead set, immutable version of bumpmapping set in silicon for the developer to turn on or off, the graphics chip featured sufficiently powerful computation and memory elements for the developer to program their own version of bumpmapping. This key trend occurred in 2001 with the introduction of NVIDIA's GeForce 3 processor, the first GPU to allow developers to map their own shaders into hardware.

This trend rained down mixed blessings on all parties. APIs generally became easier to manage, hardware became leaner and faster and game developers got all the flexibility they dreamed for. Of course none of these were perfect. Different vendors still had different levels of shader compliance, hardware often had bullet point features that were unexposed in shipping drivers and developers had to write assembler code to take advantage of the new shader hardware.

DirectX9.0's launch brought three key updates: floating point colours, high dynamic range and the Higher Level Shading Language (HLSL). With effectively only two hardware vendors left, the API is no longer being torn in multiple directions but has evolved into three shader versions to cover hardware from DX8.0 to the latest DX9.0 GPUs.

The near future

If you keep up with buzz words, then one interesting trend is how quickly they've disappeared from the GPU feature list (spare XGI). From ATI's TRUFORM to NVIDIA's Transform & Lighting, 3dfx's T-buffer to Matrox's Displacement Mapping: none of them are in discussion anymore. Have they simply disappeared from the hardware? No. Rather, they have become absorbed in the shader hardware. About the only parts of the GPU that still operate in fixed function mode and hence still worthy of a specific name are the latter stages of the rasterisation process such as alpha and stencil testing, features so primitive as not to warrant any attention. Every other graphical effect is just 'shader'.

As previously mentioned, shaders moved the graphical feature set from hardware to software; the game developer writes code within limits of the hardware which can produce a wide variety of effects. While in the beginning this was essentially a nightmare (no one could program DX8.0 assembler), today with HLSL and floating point formats, shaders have gained immense popularity. And curiously, this type of architecture has raised a new question – how flexible are these shaders and what else can they do other than graphics?

The standard programming model for the CPU presents the developer with an instruction set, an address space (memory) and the ability to randomly read, write and operate on this memory. On the GPU, such a model doesn't exist. The instruction set is there, nicely abstracted by HLSL. There's also plenty of memory and very high bandwidth to go with it. But unfortunately, the memory doesn't have a logical address space. To make things worse, the only way to use memory is to store data as textures. On top of this, one cannot trivially write randomly into the

ABOVE: A key feature of photon mapping is the simulation of caustics. These reflections form when light converge in a particular pattern as it interacts with a particular material. When photon mapping is coupled with raytracing, very accurate lighting can be done without the need for shaders.

ABOVE: Hybrid implementations of raytracing can simulate indirect lighting. This image shows the effect of colour bleeding. Observe how the blue wall casts a tint on the white block. Yellow is also diffused from the cube on the floor and adjacent areas.

graphics memory, making it essentially read only from the programmer's point of view. Finally, despite much improved instruction lengths, the latest GPUs still have hard limits on the number of executable instructions, nested referencing and flow control. However despite all these shortcomings, the lure to harness the power of the GPU is stronger than ever.

Afterall, a simple fact stands: nothing on earth can provide the floating point calculations per dollar as efficiently as the GPU. Nothing is quite as ridiculously parallel. And nothing can match the immense momentum for GPU development created by the gaming industry. If CPU advancement is dictated by Moore's exponential growth then GPUs have an even steeper curve. The embarrassingly parallel problem they seek to solve allows GPU designers to double performance simply by doubling pipelines. There's also no need to occupy half the chip with cache and legacy instruction sets. An ATI X800 has 16 pipelines each with its own densely pipelined pixel shader. At peak this allows five floating point operations to be executed over 216-bits of floating point data per cycle. In comparison a Pentium 4 with its single instruction issue, 128-bit vector data looks like a stripped chicken. Even if you factor in its regular FPU and the six fold clock speed advantage, an X800 still wipes the floor clean with a sixteen fold pipeline advantage. Combine this sort of potential with technology like SLI and you can double your processing power in a pinch. In terms of cost effectiveness, CPUs can't come close.

However GPUs are a lot like natural energy sources – abundant, exuberant, but a total pain to harness. First and foremost they lack a programming model for general use. If you want to write a simple program, you'd have to do it entirely in the pixel shader. This means understanding everything that happens in the pipeline prior to and after pixel shading, not exactly intuitive. If you want to write a sorting program, well, forget it – you can't do random writes to memory. You may have to learn multi-pass shaders before you can even bubblesort!

It would be tempting to envision a future where the GPU can behave identically to the CPU, allowing total ease of programming. This is not likely to happen nor should it. We need a new programming model optimised for the GPU, not an old one bolted on to it. Fortunately, there's no need to start from scratch, there's already an excellent model waiting to be realised.

We first heard this model, known as *stream processing*, from David Kirk when he visited Sydney during the NV30 launch. The most fundamental assumption stream processing makes is that every piece of input data is processed by the same function, called a kernel. This model maps to most 3D algorithms just about perfectly. For raytracing, this is exactly what happens as rays are traced from the screen into the scene using the identical algorithm. For rasterisation, this assumption is valid in just about any stage where some dataset needs to be processed.

The beauty of stream processing is that it inherently preserves parallelism. The kernel program, or in the case of 3D the shader program, is independent of any other shader program (there are no dependencies between pixel calculations). That's not right you may say, two reflective objects clearly depend on each other when determining their own appearance. Rightly so. But they use the same pixel shader to determine their results. That is, at the instruction level both will look up some environment map to see the reflective properties of their surroundings, absorb a fraction of that onto its own surface and calculate the final lighting values. Both reflective objects will have their own environment map which are independent of each other in processing. So in the end, both pixels are processed by the identical stream of instructions. This is the very property that allows pixels to be operated on in parallel in multiple pipelines. In short, if you want to harness the power of the GPU in an efficient manner, stream processing is probably your best bet.

Generalising the GPU

The software and hardware side of the 3D industry is linked much more closely than CPU hardware and software. The most desirable change for GPUs right now is the oft talked about total virtualisation of its compute and memory elements. But this change can only occur if sufficient demand occurs from the software side.

The best effort so far at virtualising GPU

ABOVE: What's possible: a raytraced modified version of Quake 3.

resources is Stanford University's BrookGPU (graphics.stanford.edu/projects/brookgpu), which maps an implementation of the Brook stream program language on modern GPUs. Being an extension of ANSI C, the implementation is naturally familiar to all programmers. There's no need to understand how GPUs work or how to write shader code, simply to code in Brook. Let the compiler translate it to C++ and let the runtime library map it to any supported GPU. If no GPU is present, the code is directly mapped to the CPU.

With or without adopting a new programming model, GPUs are already doing immense work outside the field of 3D. Any non-dependent problem with data that bangs into vectors and requires intensive floating point calculations can be readily mapped to the GPU. The website www.gpgpu.com keeps track of work being done on getting GPUs to run general purpose applications ranging from databases to physics equation solutions. The most exciting application however is to map a different 3D algorithm onto the graphics processor. Global illumination techniques using raytracing, radiosity and photon mapping have all reached 'interactive' speeds on current hardware, though only in proof of concept demos. Of course the resolution is very low, the framerate is often single digit but it's starting to resemble the very early days of 3D, when 320x280 was a playable resolution and 15fps wasn't all that bad.

An unlikely contestant

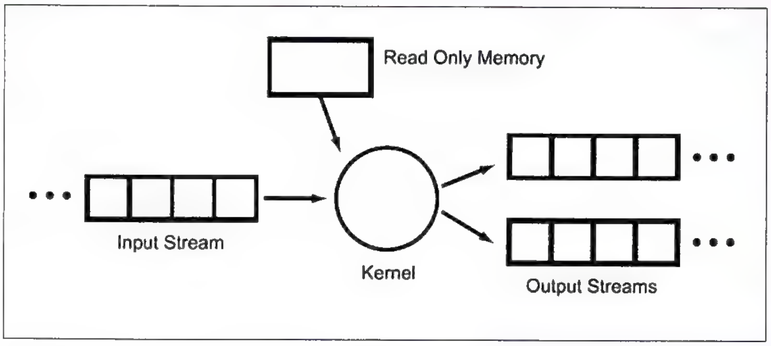
Raytracing is extremely attractive for many reasons. You get automatic visibility detection, accurate shadows, reflections and refractions. The algorithm also can handle much larger loads of geometry than rasterisation. In fact, it's seen by many as the next step in 3D. It is not surprising then that in recent years, hardware implementations of raytracing have appeared. The AR350 from Advanced Rendering Technologies and the SaarCor interactive raytracer from Saarland University are recent examples. Do these point to where GPUs are headed?

To answer this question requires asking many more: what does it mean to support raytracing in hardware? Is it to have a piece of silicon that does raytracing but nothing else? How does this compare in the long run against highly virtualised GPUs?

Despite all the automatic benefits of raytracing, to move from programmable hardware back into fixed function, no matter how lovely those fixed functions may be – even if it is raytracing – is a backward step. Although the SaarCor chip can perform raytracing faster than a DX9.0 class GPU, the same can be said for any hardwired implementation versus a software one; it's no extraordinary feat.

Raytracing is also disagreeable as it solves one set of problems and brings in another. For one, raytracing on its own doesn't produce good graphics. Radiosity and photon mapping are needed to get good indirectly lit effects such as colour bleeding and caustic reflections. Getting a specific artistic look is also much harder with raytracing than rasterisation. Finally, those pretty raytraced pictures you see on the web are mainly done on static geometry. For a non-static environment as in 3D games, raytracing performance is far from desirable.

For the record, this isn't to say raytracing isn't the way to go, just the notion of putting a hardwired version in silicon may not be the best solution. The industry has spent over eight years working around the quirks of the rasterisation algorithm; we don't need to spend another eight to do the same for raytracing. It is much better to pursue greater GPU virtualisation so that one day developers can implement raytracing or rasterisation on the GPU as a matter of choice rather than necessity.



ABOVE: The ideal model for generalised GPU programming is the stream processor. The dual benefits of massively parallel datasets and high arithmetic density help bring out the best performance in a GPU.

People who design graphics chips are known as ASIC engineers, where ASIC stands for *Application Specific Integrated Circuit*. These days are coming to a close. As it stands today, only 5 percent of the transistor budget of the GPU is devoted to rasterisation. The vast majority is devoted to floating point hardware. There's nothing application specific with what you can do with this immense array of floating point hardware, and it far outstrips what CPUs can do.

3D began with GL Quake and Voodoo Graphics, implementations of the rasterisation algorithm in software and hardware. It will end not with a generalised one just for rasterisation, but for any algorithm you can imagine and express in ones and zeroes.

PAIN SUFFE
IT'S COM
DOOM3

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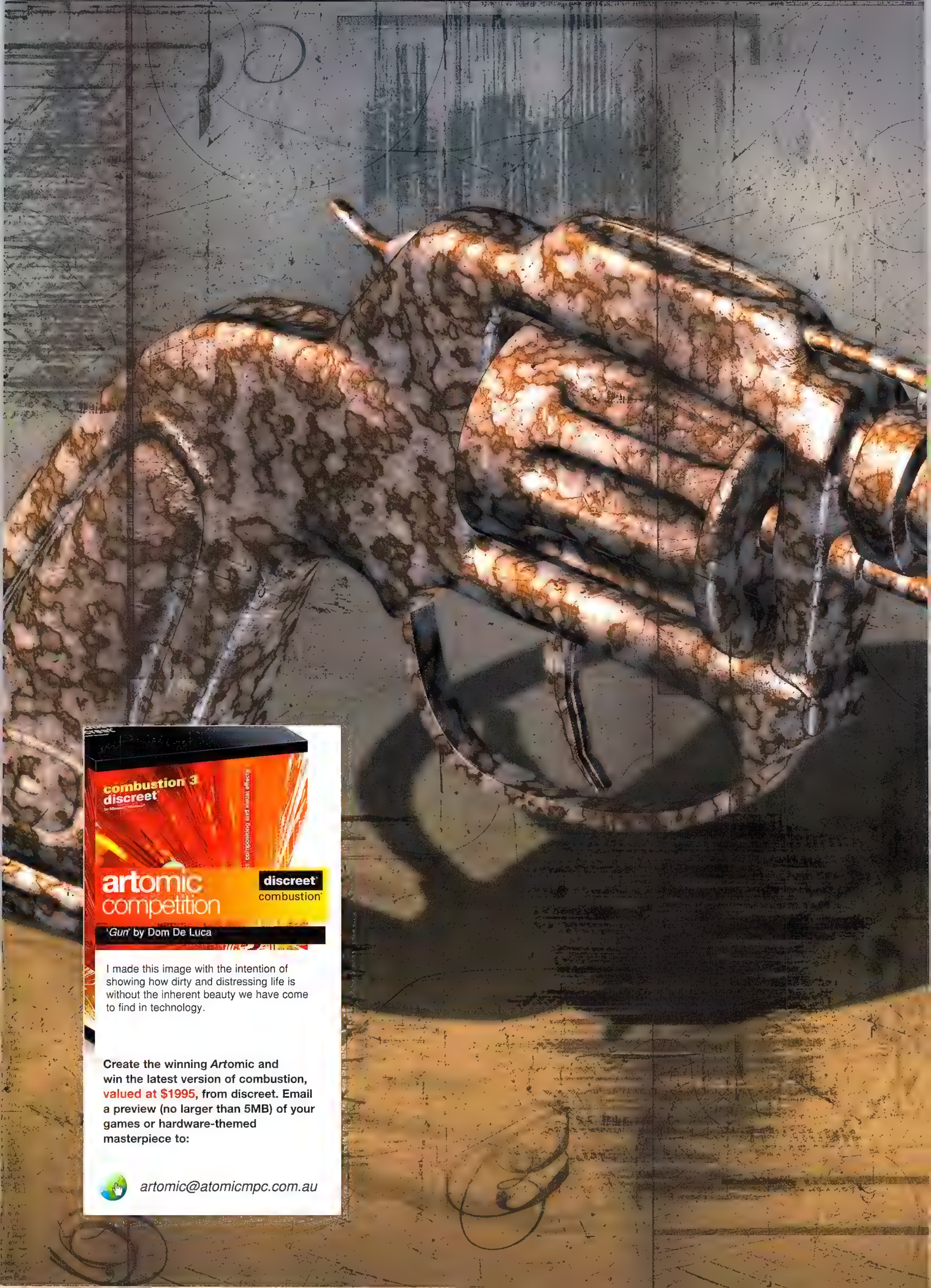


artomic competition

discreet
combustion

'Gun' by Dom De Luca

I made this image with the intention of showing how dirty and distressing life is without the inherent beauty we have come to find in technology.

Create the winning *Art*omic and win the latest version of combustion, valued at $1995, from discreet. Email a preview (no larger than 5MB) of your games or hardware-themed masterpiece to:

artomic@atomicmpc.com.au

Reviews

Global enlightenment

Doom 3 is finally here and John Gillooly wonders what comes next.

In hindsight it's bizarre that one of the most significant events in 3D graphics history was the 2001 Macworld Tokyo event. This event featured the double whammy of Dr David Kirk from NVIDIA launching the GeForce3 (and with it the era of programmable shading hardware), it also had geek extraordinaire, John Carmack uncovering Doom 3's graphics engine.

It was perhaps the first time the word 'cinematic quality' had been applied seriously to the world of realtime 3D. Kirk's presentation featured a realtime remake of Pixar's first animated short, Luxo Jr., running in OpenGL on the GeForce3. This film first debuted at Siggraph in 1986, as the first release from Pixar, which began life in 1986 as the graphics division of Lucasfilm and was purchased by Steve Jobs and set free.

Luxo Jr. was originally rendered on a Cray supercomputer, in an age before they were purely icons of computing nostalgia. Each frame took three hours to render, which at a framerate of 24 frames per second was clocked in at 75 hours of rendering per second. At Macworld Tokyo NVIDIA did exactly the same thing in realtime. Which was stunning to say the least.

But that was nothing compared to the moody, shadow heavy tech demo that Carmack showed off. It was the first truly believable use of light and shadow in a game, and started what has become a snowballing obsession for tech lovers with Doom 3 and what it promised in terms of visuals (and this early showcase now looks primitive compared to the game that id has delivered).

Since then realtime 3D has marched rapidly down the path of cinematic rendering; for example ATI's Ruby demo for the X800 was co developed with New York based rhinofx, who predominately do work for Hollywood and the advertising industry. The intricate hair of Nalu, NVIDIA's mermaid was done by the same person who created Aki's hair in *Final Fantasy: The Spirits Within*.

It's all very sexy and all, but what exactly is this cinematic rendering term that is flung far and wide with glee? Try to find a definition with Google and you will see thousands of mentions of the term, but mostly it is used as a catchphrase with little insight into why.

The term does not necessarily mean creating lifelike imagery; it mainly refers to the gaming implementation of what NVIDIA did with Luxo Jr. – creating in-game graphics that rival that which is being output by the likes of Pixar and Dreamworks.

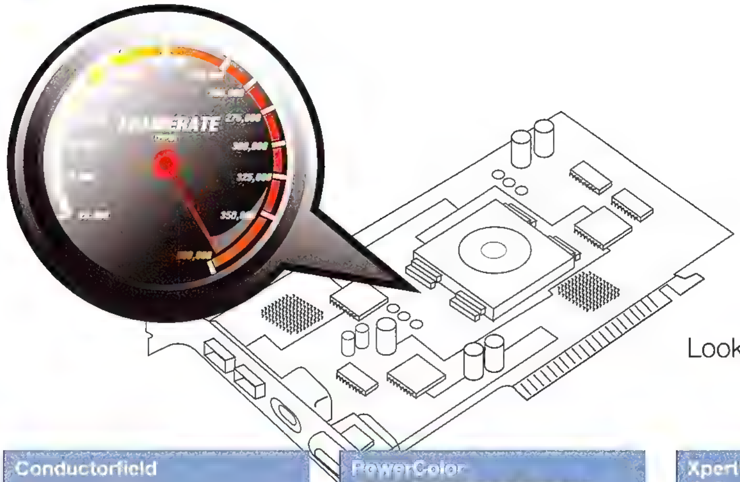
This is the key point that a lot of people, some game developers included, don't get. If you look at movies like Shrek or Finding Nemo, they aren't lifelike, in fact the people behind these movies quite deliberately leverage the technology to create worlds not possible or easily filmed in real life.

Apart from the occasional flashes of near reality, usually in close ups, the movie industry does not try to fool us into believing that an entirely CGI presentation is real. Sure, special effects can be highly effective but they enhance reality rather than replicate it (of course I am excluding George Lucas here – Jah Jah Binks makes me too angry to think straight).

Games are all about creating a believable world, and that is the generational change that we are witnessing. While games like Far Cry, Doom 3, Half-Life 2 and S.T.A.L.K.E.R. retain cartoony aspects, they are prime examples of how real time 3D is able to cope with increasingly complex and 'real' environments without trying to make us feel like we are just looking through a window into the outside world.

What pleases me most about these games is immersion, and this is what the rise in programmable hardware has delivered. It takes careful work to create immersive environments and the vast majority of this comes, not from the bells and whistles of the graphics engine, but in the way that this interacts with audio, environment, interface and the many other things that make a game a game.

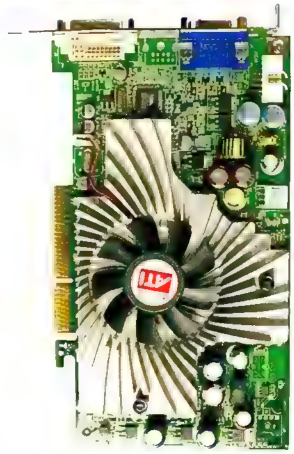
Cinematic rendering is a fantastically wonderful ideal, but by devoting too much time to worrying about this aspect of a game the important stuff can be left out. Maybe it's time for the industry to shift focus away from relentless improvements in eye candy and start worrying about the world as a whole.



Framerate

Look no further for your monthly dose of tasty *Atomic* Framerate treats.

Conductorfield
RADEON 9800XT



Specifications: ATI RADEON 9800XT; 128MB 256-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 395MHz
Memory speed: 700MHz
Price: $449
Supplier: Geciman
www.geciman.com.au

This card is a top example of what cheap is all about – and that's a great thing to see. It's a slightly underclocked RADEON 9800XT, which barely shows – in fact it beats the ABIT 9800XT. It doesn't come with any extra goodies, like games or programs, but it's not like video cards get bundled with the best of apps anyway. Cheap and just begging to be whisked away by the cash-strapped gamer, this card is unquestionably a highly attractive, no-frills option, albeit with a slightly whiny fan.

Conductorfield
www.conductorfield.com

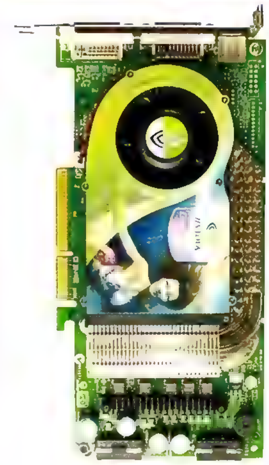
PowerColor
ALL-IN-WONDER 9800SE

Specifications: ATI RADEON 9800SE; 128MB 256-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 380MHz
Memory speed: 680MHz
Price: $352
Supplier: Australia IT
www.australiait.com.au

Considering ALL-IN-WONDER cards are geared towards servicing multimedia enthusiasts, they're not exactly renowned for their high 3D performance. So it's no surprise that this baby is a quiet performer and seeing as it has full VIVO support with a breakout box – composite video/audio and s-video in/out – and a Philips TV tuner, it's certainly well suited for a home theatre PC. Not a powerful 3D solution, but it's certainly equipped for giving the TV a decent shot at 3D gaming.

PowerColor
www.powercolor.com.tw

XpertVision
GeForce FX 6800



Specifications: NVIDIA GeForce 6800; 128MB 256-bit GDDR3 RAM; 400MHz dual RAMDACs.
Core speed: 325MHz
Memory speed: 700MHz
Price: $540
Supplier: Altech
www.altech.com.au

'What's with the FX name fixture?', we hear you say. Well, don't worry, we're just as bemused. Aside from the anthropomorphically-unconventional naming standard, this *is* a 6800 card of the regular, non-Ultra type. So that's twelve pipelines instead of sixteen. While it's by no means silent, the heatsink doesn't take up two expansion slots, thanks to its compact profile. Not exactly a raunchy beast, but it's certainly a decent next generation card for those on a shoestring, or even a moderately glitzy gumboot.

XpertVision
www.xpertvision.com.tw

ELSA FALCOX
RADEON X80 PRO

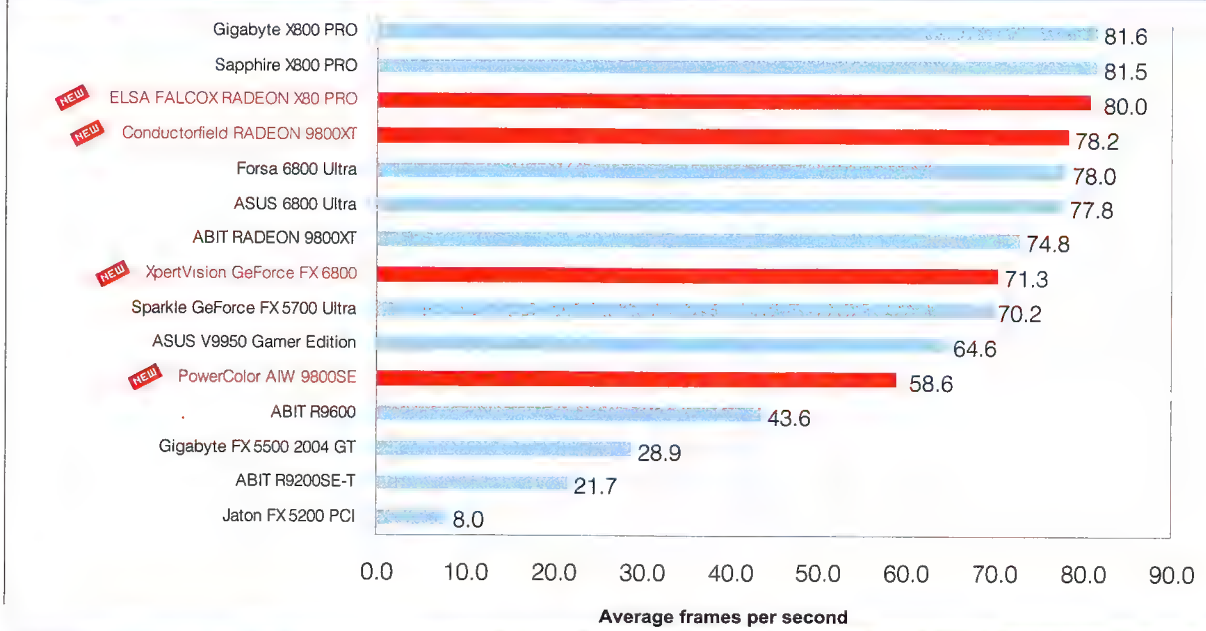
Specifications: ATI RADEON X800 PRO; 256MB 256-bit GDDR3 RAM; 400MHz dual RAMDACs.
Core speed: 475MHz
Memory speed: 900MHz
Price: $750
Supplier: Altech
www.altech.com.au

In its wonderfully bizarre tradition of dropping characters off names, ELSA's *X80* PRO is otherwise entirely identical to the rest of the X800 PROs. Like a human clone, only it's branded and not made of squishy flesh. It's powerful, frame hungry and it packs a ruthlessly juicy punch – with a superbly quiet fan. For an extra $40 you can have yourself the same card equipped with VIVO, which is all the better when you find you need that sweet, sweet VIVO functionality.

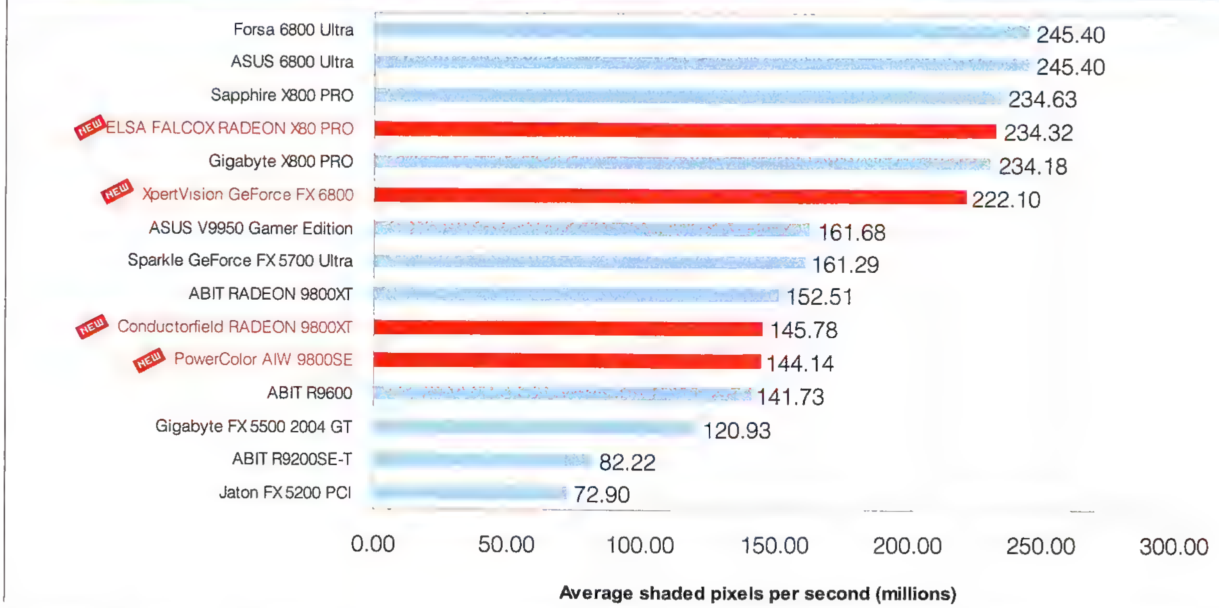
ELSA
www.elsa.com.tw

Daddy, why doesn't this magnet pick up this floppy disk?

Call of Duty



AquaMark3



Video cards

With the new generation ATI and NVIDIA products announced and starting to slide their way into the retail market, there's now a plethora of new choices on the market, and as you will see in our Head-to-Head there is a large range of performance out there.

Most cards are now available in both AGP and PCI Express variants, but from our talks with some Taiwan-based manufacturers there will be a much greater emphasis on AGP-based products, especially the high end NVIDIA kind, in retail for the near future.

Part of this is down to the nature of NVIDIA's PCI-E solution. Thanks to its HSI bridging chip, the GeForce 6-series of cores can work on both AGP and PCI-E cards. This means that most manufacturers will prioritise the building of AGP versions targetted at the wide install base, while ramping production of PCI-E cards once demand is seen in the market.

CPUs

It is almost as if AMD is taunting us to make the bleedingly obvious 'SemprOn' jokes about its choice of nomenclature for its new 'Sempron' budget core. This new 32-bit processor sports 256KB of L2 cache and comes in Socket A, Socket 754 and Socket 939 variants, and is targetted firmly at the budget market.

It is a nice break away from Socket A-only budget solutions, and will hopefully bring a smile to the face of motherboard makers as it should increase the market for Socket 754 and 939 boards significantly. Which should flow on into a wider range of products for those after an Athlon 64 system.

SemprOn, oh my.

It will be competing in the budget space against Intel's new Celeron D CPU, which is based on the 90nm Prescott-cored Pentium 4.

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The Imation USB 2.0 Swivel Flash Drive is a compact and powerful flash device that features a "never loose" swivel cap.

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www.imation.com.au

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Leadtek A400 GT TDH

Supplier:
Rectron
www.rectron.com

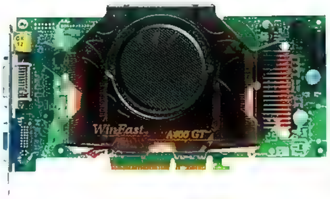
Website:
Leadtek
www.leadtek.com

Phone:
Rectron
(03) 9561 6166

Price:
$TBA

Specifications:

NVIDIA GeForce 6800 GT GPU; 256MB 256-bit GDDR3 RAM; 16 SM3.0 pixel shader pipelines; single slot, dual height card; hefty copper heatsink



Amidst the flurry of new graphics card variants appearing on the market, NVIDIA's GeForce 6800 GT has shone as the best balance of performance, price and features. Based around the same GeForce 6800 core that powers the beastly GeForce 6800 Ultra, but without the need for dual Molex power and the accompanying heat output it is a tempting offering for both current and future games.

While the reference design for the 6800 GT is a slick single slot solution, Leadtek has chosen to use a large custom heatsink on a reference design PCB. By large custom heatsink we of course mean obscenely sized chunk of copper. So obscene in fact that it's purpose has us befuddled to say the least. But the highest level of confusion comes with the decision to use a single backplate, rather than a dual one which would add structural reinforcement.

We dragged out the scales to see how much this lump weighed and were somewhat stunned at the result. A GeForce 6800 GT reference design card that uses NVIDIA's standard single height heatsink weighed a mere 304 grams, while the dual height heatsink on the GF 6800 Ultra reference design meant the card weighed 424 grams. However the Leadtek A400 GT TDH card weighed in at 744 grams, plus the heatsink is higher in profile than that of the 6800 Ultra.

Suffice to say, this means that no matter how good its performance is we would not recommend this card for a LAN box, as it will place mechanical strain on the motherboard when being bounced around in transit. If your PC doesn't move much, then it should be ok, but be aware that there are lighter cards on the market.

Weight aside, this is a damn great performer of a card and perfect for the new generation of games. Speaking of games it comes bundled with Splinter Cell: Pandora Tommorrow and Prince of Persia: The Sands of Time, which are both good looking and great playing titles. Add that in our testing this month the GT was only 5 frames behind the Ultra in all benchmarks and we think you'll agree that this is NVIDIA's sweet spot and Leadtek's hefty offering is testament to this. JG

SCORE **9/10**

PowerColor RADEON X800 XT Platinum Edition

Supplier:
Australia IT
www.australiait.com.au

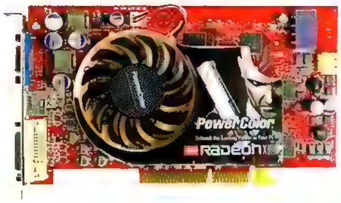
Website:
Powercolor
www.powercolor.com.tw

Phone:
Australia IT
(03) 9543 5855

Price:
$880

Specifications:

ATI RADEON X800 XT Platinum Edition VPU; AGP 8x slot; 256MB 256-bit GDDR3 RAM; needs single Molex power connector.



With the number of shader intensive games about to balloon, the new generation of graphics hardware is delivering a performance increase well above that expected through pure clock speed gains.

The number of shading pipelines is becoming more and more important, and with 16 pixel pipelines the RADEON X800 XT core is a beastly offering indeed.

This Platinum Edition model of the X800 XT runs at higher clock speeds than the standard model, adding a few extra frames to what is already industry leading performance. In our extensive graphics card testing this month (see *Head to Head, page 26*) it constantly swaps the performance lead with NVIDIA's GeForce 6800 Ultra card while maintaining a lead over the RADEON X800 XT, which differs only in clock speed.

This clock speed difference is, however, slight. The core of the Platinum Edition card is clocked at 520MHz, a mere 20MHz faster than the vanilla XT card, while the memory is an effective 120MHz faster (60MHz in actual speed). It also only supports shader model 2.0, which is not a huge downside to the product, but it will probably become a factor a year or two down the track.

With the majority of cards now on offer exhibiting few differences between the actual hardware, PowerColor has gone all out with its bundling of this card.

It not only comes in a nifty backpack (complete with notebook pouch), into which is stuffed not just the card but also copies of Hitman: Contracts and Counter-Strike: Condition Zero and one of those soon-to-be actually useful Half-Life 2 vouchers.

If bleeding edge performance is really what you hanker for then the PowerColor X800 XT Platinum edition is a tempting offering, even if the pricetag is heart stoppingly high.

It combines the performance of ATI's flagship core with a bundle that helps it differentiate itself from the pack.

Sure, the Quake 2 engine based Counter-Strike: Condition Zero isn't exactly a game that will blow you away, or even touch the sides of the X800 XT's pipelines, but the other titles are very solid offerings indeed. JG

SCORE **9/10**

Ham and Eggs: A day's work for a chicken; A lifetime commitment for a pig.

Shuttle SB81P

Bigger and badder than ever before, John Gillooly finds small form factor nirvana.

hotaward

Supplier:
SATO
www.satotech.com.au

Website:
Shuttle
www.shuttle.com

Phone:
SATO
(02) 9748 2999

Price:
$TBA

Specifications:

i915G chipset; 350W PSU; supports LGA 775 CPUs; one x16 PCI-E slot with room for dual slot cards; one PCI slot; two 3.5in SATA drive bays; one standard 3.5in bay; one 5.25 drive bay; tool-less design.

With so many small form factor models on the market nowadays it is hard to believe that it was only July 2001 when Shuttle launched its first XPC, the SV24. Since then it has continued to evolve the design of the XPC, and just when competing products were starting to catch up it has gone and raised the bar again with the SB81P.

This new model is a reaction to the increased heat and power requirements of Intel's Prescott core for the Pentium 4, with some nifty design tricks to ensure that heat does not cripple the system. This is achieved through an internal segmentation of the case design. The CPU actually sits right at the front of the chassis and ducting isolates it, allowing air to be drawn from one side of the case to the other without warming up the rest of the components. The side benefit of this is that it also makes for a quieter system; the CPU only needs one fan to suck the devilish heat of Prescott out of the box.

But the changes extend well beyond this segmentation. The case is slightly larger than previous models of XPC, but this extra space is well used indeed. It has the usual removable drive bay, which accommodates a 3.5in floppy or hard drive and a 5.25in drive.

This bay assembly also houses the card reader, which is now in its own slot, ending the era of it cannibalising a 3.25in drive bay. Plus the whole assembly now uses plastic clips for mounting, so no screws are needed in construction, and yes, that means even the drives mount using clips.

At the rear of the chassis sits a 350W power supply, as well as two extra cooling fans. 350W is a heck of a lot of power for such a small system, and is very welcome considering the spiralling power requirements of Prescott, and video cards like NVIDIA's 6800 series.

Which brings up another new feature of the SB81P. Rather than the traditional positioning of the AGP slot in the XPC, which abuts the left hand side of the case and precludes the use of dual slot graphics hardware, the SB81P has its x16 PCI Express graphics slot on the right hand side, which lets you use dual slot beasts like the GeForce 6800 Ultra and some of the more outlandishly cooled RADEON X800 cards. This XPC is based around the i915G chipset, so it has integrated graphics as well, but using them would be an insult to the latent power contained within this box.

Capping off the system, both literally and figuratively, is the inclusion of space for two SATA hard drives. These mount in removable brackets across the top of the system, and allow the SB81P to run RAIDed hard drives, which has not been feasible in the past.

With such potential in this system, we decided to load it up with some seriously power hungry hardware to see how it fared. We threw in a 3.6GHz LGA 775 Pentium 4 CPU, two SATA hard drives, DVD burner, RAM and a PCI Express GeForce 6800 GT card. One shortcoming we did find was that the limited number of power cables meant we needed to daisychain power adapters in order to get the required six pin power connector attached to the video card.

Once attached it worked fine, but it was both annoying and added an extra tangle of cables to the otherwise clean layout of the box.

Once we had the 3D stress tests running on the SB81P, the other worry we had emerged. While the ducting system is great for removing the heat of the CPU from the system, it does mean care needs to be taken to keep the sides of the SB81P clear of obstructions.

To see how it fared we blocked off the vents with some boxes and waited.

After about 20 minutes we started to hear the fan spooling up to cope with the heat buildup, and about 10 minutes after that the system crashed.

The exhaust side of the case was scalding to the touch after this, but after half an hour or so of cooling down we rebooted the system and it was fine.

Overheating will cause the Pentium 4 to throttle back speed, so fan speeds may need to be adjusted in the BIOS.

Having the hard drives just under the top cover of the case also means that this heats up as well, although not to any dangerous degree. But care must be taken with placement of the SB81P so that the air can be properly expelled.

Yet again Shuttle has raised the bar with the SB81P. Rather than just build a system to cope with Prescott, it has gone back to the drawing board and improved nearly every aspect of its already stellar design. Not only does the box contain room for a suite of bleeding edge hardware, the 350W PSU makes sure that it will run smoothly. As long as you are conscious of the need for ventilation around the chassis, this is a damn nice solution, and if Intel's CPU ran cooler it could well be classed as small form factor perfection. JG

SCORE **9.5/10**

ASUS W1N

Like 'em big? Dan Chiappini does. Check out this sexy widescreen lady.

Supplier:
ASUS
www.asus.com.au

Website:
ASUS
www.asus.com.au

Phone:
ASUS
1300 799 833

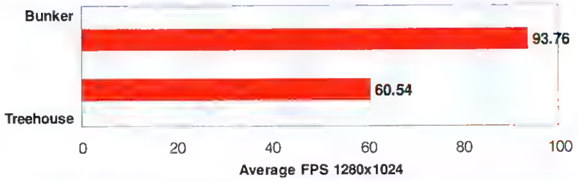
Price:
$4,499

Specifications:
Intel Centrino 1.7Ghz; 64MB ATI MOBILITY RADEON 9600; integrated TV tuner; 80GB, 5400rpm hard disk drive; 15.4-inch WSXGA display; DVD+/-R/RW writer, 56K modem, 10/100 Ethernet; Intel 802.11g wireless module; Windows XP Professional; two-year international warranty.

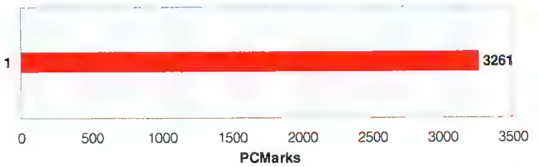
Generally, we don't cover notebooks in *Atomic* – with the odd exception given to stand outs like Dell's Inspiron 9100 high performance gaming notebook, which was reviewed back in *issue 40*. It certainly made the grade with its powerful Pentium 4 3.2GHz 800MHz FSB CPU, a whopping 2GB of PC3200 DDR and a 128MB variant of ATI's MOBILITY RADEON 9700 graphics. Unheard of in this sort of form factor.

This time, it's ASUS' W1N that's the focus of our salivation, admiration and tears of utter joy. The W1N is a gorgeous feat of engineering and aesthetics, with some kick-arse gear housed inside to boot.

Far Cry



PCMark04

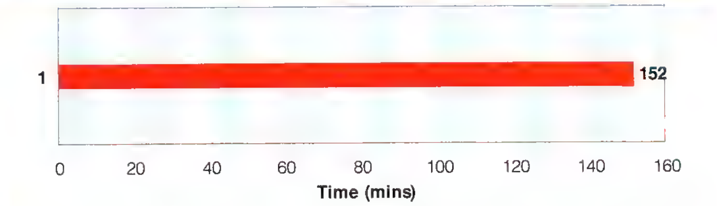


Popping the hood, this beaut features Intel's 1.7GHz first-generation Banias processor, a little disappointing given the price point and that the unit is Dothan-ready, although this may indicate future revisions will be based around the 90nm process. The unit ships with a 64MB flavoured MOBILITY RADEON 9600, which is ideal for mobile gamers and media use, complementing the gorgeous 15.4-inch WSXGA, which begs to have DVDs played on it.

Like the Inspiron 9100, the W1N features an additional third speaker mounted underneath the chassis, which is raised on rubber feet at each corner to allow sound to permeate from under the notebook. Although not true 5.1 surround sound, it does a decent job of reproducing DVD audio and puts the tinny trebly sound from budget notebooks in their place.

Another standout quality of this notebook is its integrated TV tuner module that works in conjunction with the supplied ASUS media software suite to allow you to watch TV and listen to radio, all with a touch of the supplied remote control that interfaces through the front-mounted IR receiver.

MobileMark02 – Battery Life



Pumping out just shy of 3300 marks under PCMark04, this is a productivity workhorse if need be, the 9162 points in 3DMark01SE further cementing the entertainment focus of the unit.

If you're going to sell a notebook for the gamers and entertainment users, make sure you back it up with solid graphics. Although sporting half the video memory of the Dell, ASUS' 9600 managed to push out an impressive average of 93 frames per second through our Bunker demo of Far Cry at 1280 x 1024 resolution, and did it looking smooth and sexy throughout. AquaMark3 results under the same res, in comparison, returned just shy 13.5 million polygons per second at its peak.

The left hand side of the unit houses the majority of its ports, no legacy to be found here, with your standard notebook affair and the addition of S-Video out, a single slot MMC/SD/Memory Stick Pro reader, F-type aerial adaptor, a single four-pin FireWire port and a pair of USB 2.0 inputs. Phew.

Add to this the already powerful hardware driving force, a multi-format DVD burner and an 802.11g wireless module, and you'd be pretty hard pressed to find a better featured unit going for this price.

ASUS also include a software bundle that looks more like an entry level OEM graphics card suite than a notebook bundle, while the lack of floppy drive is more than compensated for with the inclusion of a 64MB flash memory drive, headphones and an optical USB mouse.

Not surprisingly, a notebook of this form factor and this sort of feature set isn't an ultra-portable ULV processing 'book' – we gave the battery a complete charge and a strenuous productivity workload to chew on, and it ran out of juice before hitting the three-hour mark.

If you're after a widescreen unit for business or pleasure, the sleek sexy lines and performance of the ASUS W1N are hard to beat. Granted it's not the cheapest widescreen notebook ever, but it definately does have the goods when it comes to entertainment and gaming. DC

SCORE 9/10

Audion A6 and M-30 Valve Active Loudspeakers

Supplier:
Audion
www.audion-mm.com

Website:
Audion
www.audion-mm.com

Phone:
Audion
1300 300 364

Price:
A6, **$499**; M-30, **$299**

Specifications:
Specifications not available at time of print.

A review is always that much more interesting when the product in question looks like it was stolen from the set of *Star Trek*. Indeed, Audion's A6 three-piece speaker set, and its M-30 two-piece Valve Active Loudspeaker set, with their mean-looking valve components and retro design, would look perfect sitting next to Mr Spock on the bridge of the Enterprise, or drifting in space waiting for a rogue tractor beam or gravity well to reel them in.

Valve components have long been lauded as the best way to hear audio. Transistors, according to most audiophiles, will always take second place to a decent implementation of valve technology – if you associate a century-old piece of hardware as technology.

Usually when valves are combined with audio the resulting output is a 'warmer', better-sounding product. This is something that can't be accomplished with even the highest quality of audio transistors.

Unfortunately, the A6 and M-30 don't help the argument.

First comments go on the poorly-thought out design: while not hard on the eyes with their sleek protective grills and shiny black housing, the units are easily bent, scuffed and damaged. It's a surprise considering how solid and heavy the sub and speakers look.

The protective grills also heat up quickly, thanks to their close proximity to the valves, which get pretty darn hot – something to keep in mind if you keep combustibles, such as paper, curtains or children, near your computer or entertainment unit.

As for their fidelity, the sub was disappointingly average and the valves for the left and right speakers seemingly added nothing to the normal audio experience of music playing. With a bit of tweaking, we were able to get more depth from the sub, but it certainly wasn't earth-shattering or even noteworthy.

It's hard to understand why the speakers did not perform better. Valves are overkill for the normal user, and, considering the price tag for the units, you'll be hard-pressed to find a reason to pay out big dollars for valves, when for the same cost you could have a decent 5.1 or 7.1 set with a good sub. LB

SCORE 5/10

NYKO Air Flo mouse

Supplier:
CONEXUS
www.conexus.com.au

Website:
NYKO
www.nyko.com

Phone:
CONEXUS
(02) 9975 2799

Price:
$49.95

Specifications:
800dpi optical USB mouse; right/left click and scroll; speed adjustable hand cooling fan.

Seldom a major innovation is seen in a widget such as the mouse – the last major inventive improvement would have to have been ripping out the ball for optics. It's had pretty much everything else done to it. Or so we thought, until we laid our greasy hands on this right munter. It both sucks and blows, and in quite a pleasurable way.

You see, this new hole-filled mouse has an inbuilt fan to keep those hot sweaty hands cool and dry. The air intake is at the front under the USB cable with two air extraction points located on either side of the mouse and another two on either side of the palm area.

We're not sure about the health benefits and issues of continually keeping your hands dry – perhaps it'll stop tinea 'gamer hand' – but this crazy invention is strangely comfy.

A tad weird at first, but you fast get used to the slow, soothing, airy feeling. You can flick a three way switch on the base for the fan to operate to your liking – off, low or high. Low or high, the fan has a little vibration, but it's so slight it almost becomes ambient.

Aside from ridding the mouse of your hand sweat stench, it's great to cool down your muscles when doing some fiercely repetitive work. This helps you last longer in such situations, as proved by our rigorous muscle straining tests.

It's a very light mouse – with rubber grips on the sides, it's only too ready for fast-paced FPS mouse-flinging goodness.

hotaward

The design isn't unlike that of the MS IntelliMouse Explorer, with a rise in the middle so your hand hugs the mouse comfortably.

Importantly, it performs well too, delivering precise movement at 800dpi with the included pads underneath providing the smooth traction you need.

If you're anal about having an IRQ set aside for your mouse, it doesn't come with a USB to PS2 adapter, but if you grab an adapter, it works perfectly. Even with the fan on.

This mouse sports an inventive idea which works well for muscle straining activities and sweaty hands. If you have a problem with either, this mouse was made for you. ND

SCORE 9/10

Lian Li PC-V1200

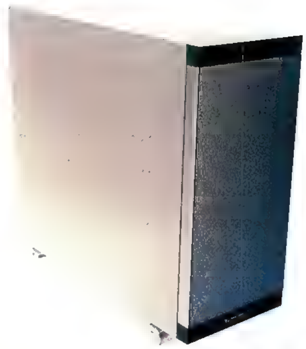
Supplier:
Anyware
www.anyware.com.au

Website:
Lian Li
www.lian-li.com

Phone:
Anyware
(07) 3856 3999

Price:
$TBA

Specifications:
ATX case; five 5.25in drive bays; six 3.5in internal drive bays; acoustic foam lining; aluminium front door; two 120mm fans; no power supply.



After so long without any dramatic changes to its products, Lian Li is now introducing a range of new cases based off its V-series design. A couple of months ago we looked at the flagship V-1000 case, which made so many nods to Apple's G5 design that we suspect the Lian Li R&D team could well be suing for whiplash.

While it is based on the same internal design as the V-1000, the V-1200 has a different look and purpose to its holey sibling. It is billed as a silent computing solution, and attempts this via the use of a firm shell and a liberal spreading of acoustic foam rubber to dampen the howl of a beastly system.

This starts with the solid front door of the case, which has a rubber seal to block drive noise, and unlike some other cases, is actually made of nice, strong aluminium.

The case ships with one stealthed optical drive cover, which is a strange choice considering that the door is designed to stay closed when the drives aren't in use.

There is still a front fan intake, however this is on the base of the case just near the door, so care must be taken to ensure that it is clear of obstructions to ensure good airflow into the case.

The side panels are completely coated with acoustic foam, as is the top of the case, and the only place sound can escape is through a small grill and a 120mm fan outtake on the rear of the system.

hotaward

This is an effective dampening solution, but like most supposedly silent cases you need to meet it halfway by ensuring you use low noise components. If you pack the case with high speed fans and the dampening will suppress the high end whine, but not the entirety of the noise.

The V-1200 is an amazingly well built case, and while calling it a silent case is going a bit far, it does help to quieten a carefully built system. Because of this, and also the heat trapping ability of the foam, we wouldn't recommend it for an overclocked beast of a system, but with a little care taken with component choice it can make your computing life a little less noisy. JG

SCORE 9/10

Nokia N-Gage QD

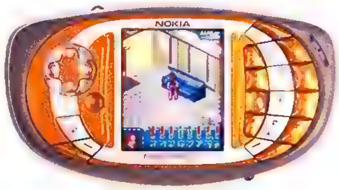
Supplier:
Nokia
www.n-gage.com

Website:
Nokia
www.n-gage.com

Phone:
Nokia
(02) 9429 9000

Price:
$389

Specifications:
ARM4T 104MHz CPU; 4096 colour 176x208 pixel display; Symbian 6.1 OS; Series 60 interface; Bluetooth; MMC slot; bundled with 'The Sims: Bustin' Out'.



Nokia's N-Gage is a considerably well featured mobile phone and a decent enough gaming platform, yet it will be forever remembered as 'the Taco', thanks to its awkward and goofy looking sideways talking feature. While this is certainly functional, it is a very uncomfortable way to talk and also a nightmare if you are trying to talk in a crowd, or under the fuzz of poor reception.

So it is unsurprising that Nokia has taken the criticisms onboard and designed a second type of N-Gage, the N-Gage QD. This is a smaller sized phone that drops some of the features of the N-Gage and improves on others. Most importantly it can be held flat to the head when talking, but it also brings the ability to change the game MMC cards without removing the battery. It also features a long better battery life; a redesigned keypad and a brighter screen.

These are all very welcome, especially the new keypad, which has a better layout for games like Tony Hawk, however the omitted functions have caused some head scratching around a few at the *Atomic* office.

Gone are the digital radio and MP3 player. Also gone is the ability to hook up to a PC via USB (PC connectivity is now through Bluetooth only or via an MMC card and reader).

Considering the much more user friendly nature of the QD, and the ability to swap memory cards easily, it makes little sense to drop these features. The first model N-Gage is still the better featured offering. If you ignore the fact these are missing, the N-Gage QD is an eminently more user friendly phone.

It still suffers from some rather quirky software design (for some reason the clock settings are still in 'Extras', while things like setup and call log come under 'Tools'), and the screen's lack of peripheral vision is frustrating on all but a handful of games.

For day to day use it is more than adequate, especially considering the low price tag attached to it.

But despite the fact that the library of games for N-Gage is growing, as a gaming platform it is soon to be usurped in performance by the next generation of phones using hardware 3D accelerators. JG

SCORE 8/10

I couldn't repair your brakes, so I made your horn louder.

Shuttle XP17

Supplier:
SATO Technology
www.satotech.com.au

Website:
Shuttle
www.shuttle.com

Phone:
SATO Technology
(02) 9748 2999

Price:
$TBA

Specifications

17in TFT; 1280 x 1024; 16ms response time; 260cd/m2 brightness; 450:1 contrast ratio; D-Sub and DVI.

Shuttle – the folk that consistently create damn good mini barebones systems – are heading into the display market with their debut 17 inch TFT unit.

It's easily converted between portrait and landscape views via the well designed stand and if you have a wall fetish, the stand can even be removed to support an official VESA-standard wall mount.

Spitting out a native resolution of 1280 x 1024, this black-yet-strangely-Apple-flavoured display is styled to match the Shuttle XPC series. Weighing in at 4.3kg there's even an optional slick carry bag.

The viewing angle is listed as being 140°, but the image noticeably loses colour when seated anywhere other than a much smaller-than-140° window in front. The overlaying screen is diffused glass, which certainly helps to rid it of any unwanted shine, but isn't as effective as other non-reflective screens.

Unfortunately our preview sample had the cliché bugbear of a dead pixel, and while we'd assume Shuttle will have a good replacement policy for dead pixels Shuttle hadn't released one at the time of printing.

We had a gripe about the menu buttons, as they're way too small to be located under the left hand side of the display, making way for unco-fumbling around adjusting the settings.

Our primary concern was excessive backlight glow. This was mostly visible on the lower right hand corner of the screen and became a distraction, but was really only a problem when deep blacks were displayed.

Seeing as it's neither a BenQ nor a Samsung display (currently the only manufacturers of 12ms displays), it runs at a healthy enough 16ms.

There's the usual subtle LCD blur if you look for it, but as with all other 16ms screens, it doesn't affect the experience.

Loading up Far Cry, the display was quite beneficial to our elite blood spillage skills and in fact this 260cd/m^2 panel was a joy to play on.

With Shuttle's sexy styling and its feisty 16ms put to good use, it's not a shabby display, but there is a small concern for the uneven backlight. As a preview unit this may well be fixed for its official release.

ND

SCORE

Bitspower Aurora

Supplier:
PC Range
www.pcrange.com.au

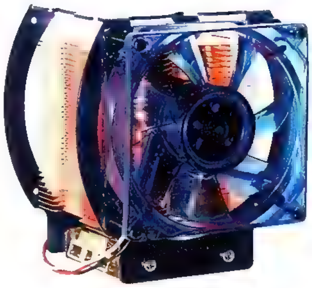
Website:
Bitspower
www.bitspower.com

Phone:
PC Range
(08) 8322 9544

Price:
$79

Specifications

Copper Socket A HSF; 2500rpm fan speed; 530 grams.



Nonsensical cooling units such as this 'Aurora', an apparently luminous atmospheric phenomenon device, bewilder us *Atomic* labs monkeys. Why? All for making a visually appealing unit, many manufacturers are stacking up on the pretty parts rather than what matters – the performance. Sure, copper looks trippy but if no decent level of thought is put into a design, the benefits are scarce.

This widget primarily consists of an array of copper fins layered around a large, copper pipe in a centrifugalish manner. Just because it's copper doesn't mean a lack of design ingenuity won't matter. It does. Why the convexly-curved fin shapes? If they didn't have this sizable shape cut into them on either side, the overall heatsink would have more surface area to pass heat through, and thus cool slightly more effectively. Down the centre of the fins is a massive heatpipe Bitspower have called a 'Heat-Column'. Despite its name, it doesn't appear to work exceptionally well at all.

Firing up our heat-monger Chernobyl to the usual 80W, in ambient 22° sitting on our Athlon XP plate, it levelled at a dull 53°. The Gigabyte 3D Cooler Ultra comparison HSF spat out a much nicer 48°.

If it had more, larger fins and several well-placed heat pipes, the design would be more efficient. True heatpipes do a lot for heatsinks. Unlike the heated fins, the blue frame that is made of an aluminium alloy is always cold. Not surprisingly it's not attached as part of the cooling system, so it isn't effective in the slightest.

The two good things about this HSF are its lighter than the usual copper heatsink and a low noise level. It's barely audible when flicked on, all thanks to the kit being packed with an 80mm 2500rpm fan. However, this also partially explains the lack of heat annihilation.

It seems this was a try at a look-good HSF with no real thought put into making it a brilliant cooling unit. It 'works' fine, and if you're after a heatsink that'll just do the job, this would be acceptable, but as a performance heatsink it's unspectacular. Considering its expensive mediocrity, it's a possible contender for FrisbeeMark'04 Deluxe.

ND

SCORE 5/10

www.lian-li.com

LIAN LI

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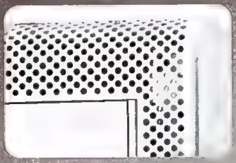
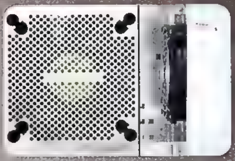


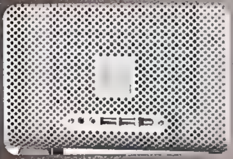
Perforated panels allow for improved ventilation

High quality stainless steel power button

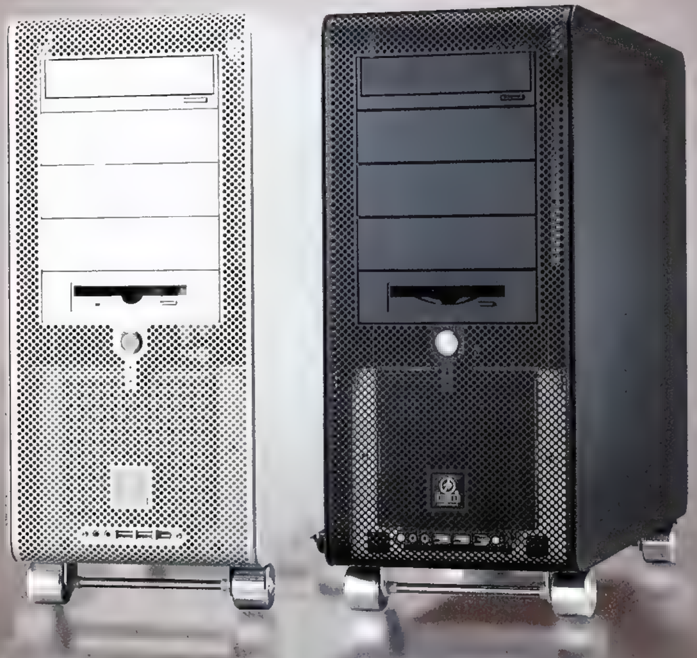
5.25" bay converted to 3.5" bay with aluminium FDD bezel (5 x 5.25" bays)



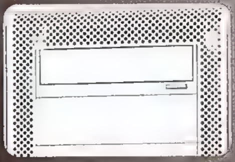
12cm ball bearing fan with quick removable sound damping cover and anti-vibration rubber ring in rear panel



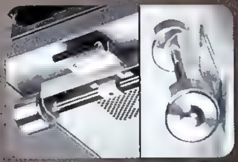
Multi-media I/O (IEEE 1394/USB/MIC/EAR)



Separate power supply zone with holes for cables

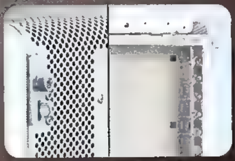


Aluminium CD-ROM bezel



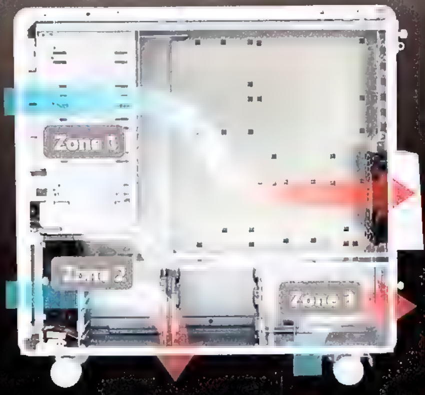
Aluminium casters with brakes

Sliding tracks for easy assembly of HDD (6 x 3.5" bays)



Captive screws allow for easy removal of side panels

12cm ball bearing fan with filter and anti-vibration rubber ring in front panel



Zone 1
Rear 12 cm fan is located next to the CPU Cooler

Zone 2
Front 12cm fan is located next to the HDD

Zone 3
Power supply fan circulates cool air from the bottom of the case out through the rear panel

hotaward

"...one of the standout cases on the market, with a price tag to match" (Atomic Magazine)

"...there is hardly a flaw to be found in the entire PC-V1000" (Tom's Hardware Review Site)

"Lian Li have always made cases that look great and don't rattle, but the V1000 takes it to a new level" (Dan's Data Review Site)

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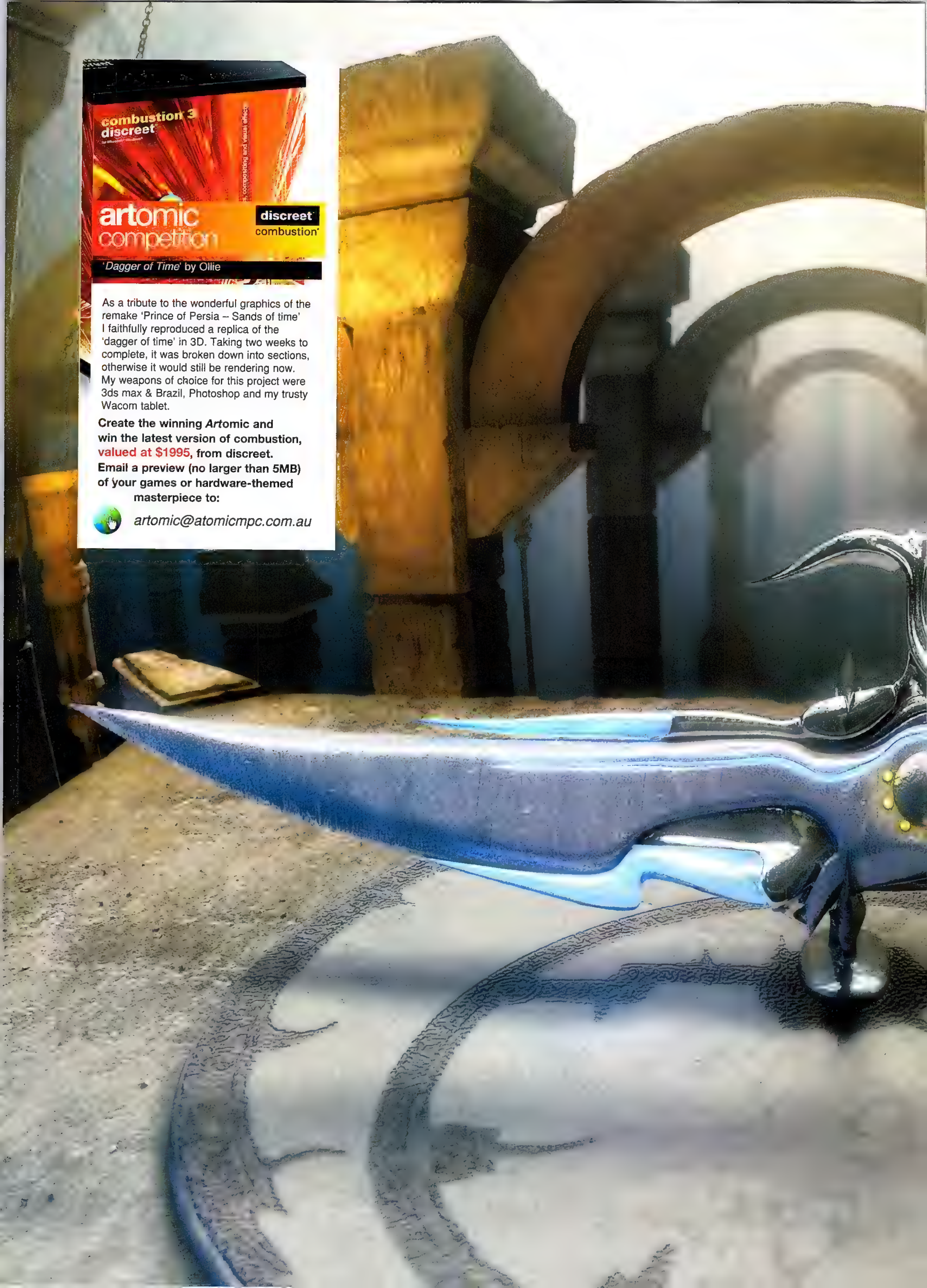

artomic competition

discreet combustion

'Dagger of Time' by Ollie

As a tribute to the wonderful graphics of the remake 'Prince of Persia – Sands of time' I faithfully reproduced a replica of the 'dagger of time' in 3D. Taking two weeks to complete, it was broken down into sections, otherwise it would still be rendering now. My weapons of choice for this project were 3ds max & Brazil, Photoshop and my trusty Wacom tablet.

Create the winning *Art*omic and win the latest version of combustion, valued at $1995, from discreet. Email a preview (no larger than 5MB) of your games or hardware-themed masterpiece to:

artomic@atomicmpc.com.au

Games

Grill Bill

Who takes a year to make a company logo? Logan Booker has the answer.

Like Krispy Kreme doughnuts, Jessica Alba and Hamtaro, so too does Bill Roper occupy a warm, supple alcove in the hearts of teenage gamers worldwide. A man, whose love of the gaming community is only exceeded by the girth of his pants; a man so loquacious that he is more than happy to speak about the exact same topics, on more than thirty separate occasions, within the paltry space of six months. Now, this may not sound like much of a feat, considering most people of import are interviewed every day on the very same stuff they've been talking about forever. What makes Bill particularly special is the fact that he can hold a half hour conversation on something that doesn't exist and he knows next to nothing about.

It's a gift few possess.

There's not a soul in Korea that isn't aware of Bill's unfortunate departure from Blizzard Entertainment, a tragic event we were all subjected to back in July of 2003. In an attempt to 'open communication lines' with their owner Vivendi, Bill, along with Erich and Max Schaefer, and a couple of other random Blizzard North compatriots, tendered their resignations with the struggling French publisher.

They were, to use a technical phrase, 'reasonably confident' their ambitious gamble would pay off. But, much like any sort of delicate surgery, there was that lingering chance that a bumbling intern would slip and embed both scalpel and poorly secured personal effect firmly into their exposed giblets.

Well, Bill and his buddies brought home more than just their carry bag and painkillers. Vivendi, much to the surprise of the entire planet, accepted their resignations and booted Bill and his assorted groupies out of the family. Blizzard, having berthed big Bill for almost a decade, was sad to see him go, as was a large chunk of the gaming community – a community that would quickly recover and continue to complain about imbalances in Warcraft III and craptacular item drops in Diablo 2. Except now they could blame it all on Bill's egress. He became a martyr for all of Battle.Net; the online Jesus for Kekes and ^_^s. Glorious, considering he had next to nothing to do with the hardcore development of these titles.

In the same month that Bill was expelled from Vivendi's maw, the group of ex-employees formed their own game company – Flagship Studios (www.flagshipstudios.com). For the better part of its existence, the nine-man think tank has operated out of one of the developer's houses – always a bonus when searching for a publisher – and upper management bubbles with Art Directors, Technical Directors, CEOs and COOs – which is all good and well if you actually have people to direct and workers to office.

This goes some way in explaining why Flagship Studios has yet to present actual in-game shots, or even the briefest of breakdowns on what their game is about. It's been over a year since the company was founded, and only recently have they summoned an office from which to operate from. At E3, we were witness to perhaps the most vacuous of game trailers, and even the company's fansites – that's right, *fansites* for the *company* – are becoming exceedingly desperate for something resembling a game. To quote one devout 'Flagship follower': 'Flagship Studios hasn't released a friggin' thing since the logo! As the great and mighty Robin would put it... "Holy lack of information, Batman!"'

It's a small wonder they roped in a publisher, in this case Namco, at all, if this was all they had to present – along with whatever three-page, hyperbole-crammed, napkin-scrawled design document they could put together. An all-star cast can only take you so far, as *Baywatch Nights* has shown. Even the most zealous of fans can tire of concept sketches and nonsensical, regurgitated answers.

Unfortunately, it's something we've come to expect without realising it – the delays, the unfulfilled promises and the wavering game concepts. We're talking about ex-Blizzard guys, remember?

The Way to get into the Game

Logan Booker takes a look at ATI and NVIDIA's game of hyperbole.

Buying a video card has never been easy. In fact, over the last few years, the decision has grown increasingly harder to make, to the point where today, there is no correct choice – just a compromise.

Hardware upgrades aren't like clothes, appliances or furniture – while it may take many years for these mundane items to become outdated, most computer components are relics the moment you slap down your money, pull out your credit card or sell your kidney.

Confounding this compromise is the added choice of graphics chip manufacturer. Right now, there are really only two contenders: ATI and NVIDIA. Back in 2002, in an attempt to raise 'customer awareness' of its products, NVIDIA launched its 'The Way it's Meant to be Played' initiative.

At the time, the hardware behind this initiative was NVIDIA's steamy GeForce4 chipset, and indeed, considering its performance and well-endowed feature set, it was very much the chip to tout.

Unsurprisingly, now that its range of hardware poses serious, and consistent, competition, ATI has started talking up its own less-than-imaginatively named customer awareness program, 'Get in the Game'. And ATI certainly has reason to – its R300 series of chips fairly trounced the GeForce4 and FX, and the latest batch of R420-based cards continues to keep NVIDIA on its toes.

The point of these awareness programs is to inform potential buyers of the benefits of each card. However, they also have a somewhat nefarious secondary 'benefit' – convincing these same buyers that only certain cards will play certain games at their best. This is thanks to games being branded in concert with these awareness programs. Unreal Tournament 2003, for instance, features the Way it's Meant to be Played branding, but it will run just as well on a RADEON as it will on a GeForce.

By collaborating with a particular awareness program, a game studio will receive specialised support when developing their titles. For example, ATI has a small, dedicated team of technicians who travel to various parts of the world in order to help developers tweak their games to run best on ATI's hardware. In return, the game will be branded, in some fashion, with GITG. In a way, everyone wins, except for the confused game-purchaser, who won't know for sure if the latest and greatest games will play on their 'non-compliant' hardware.

With standards such as ATI's 3Dc, normal mapping and Shader Model 3.0 still in a state of flux, gamers should not have the added burden of wondering if the manufacturer of their graphics chip will determine which titles they can ultimately play.

After witnessing Epic's unbelievable Unreal Engine 3 at this year's E3, the last thing we'd want to find out is that it'll only play nice with one manufacturer's graphics chip. As unlikely as it sounds, competitors are competitors...

Developer quote of the month

'...It's really important to us that this [Get in the Game] genuinely helps game developers and players. We don't intend to invest money in getting our logo into the splash screens of games since we think that is amazingly unproductive.'

ATI's Head of European Developer Relations, Richard Huddy, on 'Get in the Game'.

ShortCircuits

After four weeks of development, the 1.2 patch for Far Cry is out. Despite featuring speed optimisations for hardware compatible with Shader Model 3.0, it doesn't improve rendering quality. Sources have gone as far as to suggest that the speed boosts are thanks to special optimisations for NVIDIA hardware rather than the new code path. It's not out of the question, considering NVIDIA's GeForce 6800 is the only chip available that supports SM 3.0.

By the time you read this, the first DOOM 3 deathmatch tournament will have been held at QuakeCon. NVIDIA and id Software arranged almost US$150,000 worth of prizes for the event. The tournament, located at the Gaylord Texan Resort and Convention Centre in the US, also featured a Quake 3 1vs1 and Quake 3 Capture the Flag competition. For more information, check out www.quakecon.org.

Digital Illusions, developer of the Battlefield series of FPS has issued a press release stating that over four million copies of Battlefield: 1942 have been sold worldwide. This includes various expansions and spin-offs. The release also said that the company has plans to release a boxset, called Battlefield 1942: The WWII Anthology, including the original and Road to Rome expansion.

BUZZWORDIKAN

Shader Model 3.0

An updated graphics coding model that allows for more impressive effects in games. At present, SM 3.0 is only supported by NVIDIA hardware, (GeForce 6800). SM 3.0 includes: support for larger min and max instruction counts; centroid sampling; dynamic branching and a wider variety of texture instructions.

A bartender is just a pharmacist with a limited inventory.

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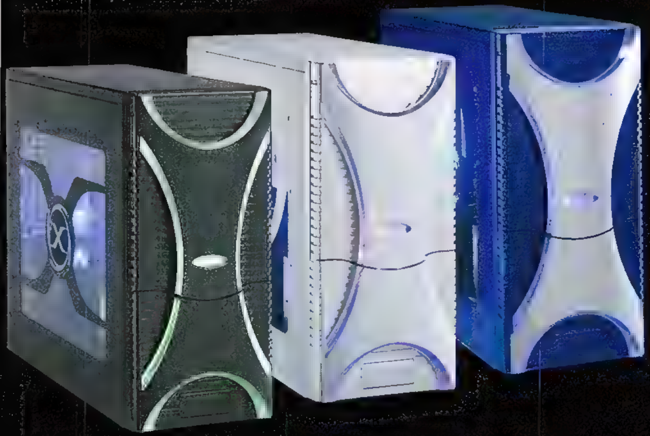

- Airflow hole around the entire case for the best heat dissipation.
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- Build-in removable air filter in the front and sliding drive rail assembly.

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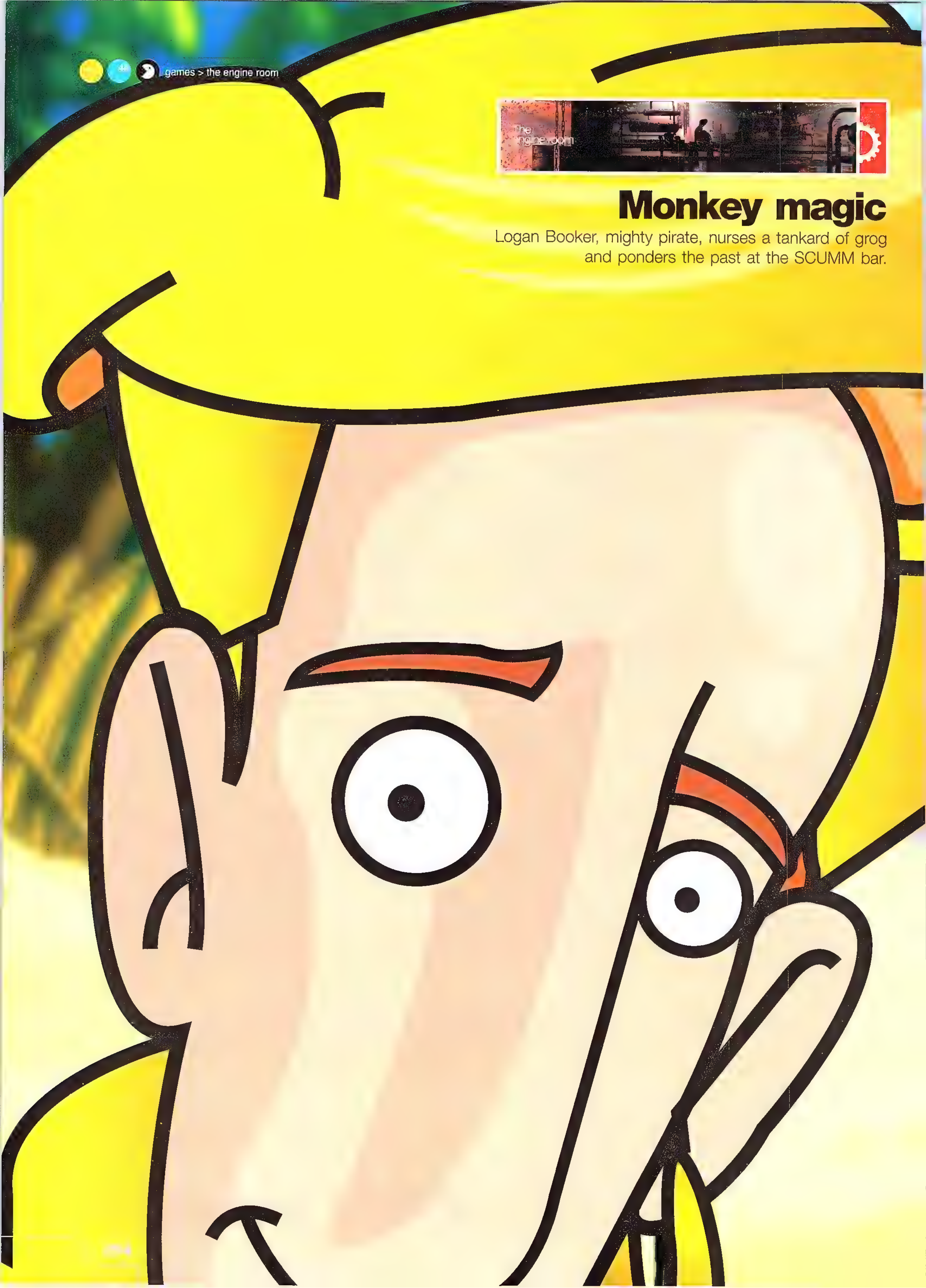


Monkey magic

Logan Booker, mighty pirate, nurses a tankard of grog and ponders the past at the SCUMM bar.

Before Doom, and even Wolfenstein 3D, there was *SCUMM*.

No game engine comes close to matching its longevity, including Quake 3 or, indeed, the total combined intellectual property of the Unreal series. It's a big misnomer to even compare SCUMM to these 3D powerhouses, considering the engine was developed by LucasArts as platform for its range of adventure games – a genre that easily outclasses the first person shooter. Titles lucky enough to use SCUMM as their foundation include Full Throttle, Loom, Indiana Jones and the Fate of Atlantis and three of the four Monkey Island titles.

The acronym, uncompressed, stands for 'Script Creation Utility for Maniac Mansion'. As the name states, SCUMM was originally hatched to power Maniac Mansion for the venerable Commodore 64. Since then, it's seen 20 or so versions, including a major rewrite in 1990 for the Secret of Monkey Island. The last game to ever use SCUMM was the Curse of Monkey Island in 1997, when it was ported to the 32-bit platform of Windows, and sadly, never used again. Grim Fandango and the fourth Monkey Island game, Escape from Monkey Island, were made using a completely new engine called GrimE.

Technically, SCUMM has been dead for seven years, and oddly enough, its demise coincides with the death of the adventure game genre. While Full Throttle 2, and Sam and Max: Freelance Police were recently in the pipeline over at LucasArts, both have been cancelled. Whether or not these titles were based on a new version of SCUMM we will never know.

SCUMM interpreter versions

Version	Game
1	Maniac Mansion (C64)
1	Zak McKracken and the Alien Mindbenders (C64)
2	Maniac Mansion
2	Zak McKracken and the Alien Mindbenders
3	Indiana Jones and the Last Crusade
3	Zak McKracken and the Alien Mindbenders
3.0.22	Indiana Jones and the Last Crusade
3.5.37	Loom
3.5.40	Loom (alternate version)
4.0.67	The Secret of Monkey Island (EGA)
5.0.19	The Secret of Monkey Island (VGA Floppy)
5.1.42	LOOM (256-colour CD version)
5.2.2	Monkey Island 2: LeChuck's revenge
5.3.06	The Secret of Monkey Island (VGA CD)
5.5.2	Indiana Jones 4 and the Fate of Atlantis (DEMO)
5.5.20	Indiana Jones 4 and the Fate of Atlantis
6.3.0	Sam & Max (DEMO)
6.3.9	Day Of The Tentacle (DEMO)
6.4.2	Day Of The Tentacle
6.5.0	Sam & Max
7.3.5	Full Thottle
7.5.0	The Dig
8.1.0	Curse of Monkey Island

ABOVE: Although SCUMM only saw eight major versions; it went through countless revisions, as well as numerous platforms, including the Commodore 64, and a number of evolutions on the PC.

Verbal kit

There are – or were – two varieties of adventure games. Text-based 'parser' adventures, which encompass both Infocom games, such as Zork, Hitchhiker's Guide to the Galaxy and the risqué Leather Goddesses of Phobos, powered by Z-Machine; and Sierra's distinct flavour of adventure game in the form of Police Quest, King's Quest and Quest for Glory (or Hero's Quest as it was originally titled, but thanks to some legal machinations by Bradley Games – owners of the Hero Quest board game – it was renamed).

The other variety is the 'point-and-click', which is the more widely known and recent of the two. LucasArts owned the market as far as these types of games were concerned, and it wasn't long before pure text games died out and the once parser-based graphical games converted to the mouse powered way of adventuring. This complies with a trend of gamer laziness we're now experiencing the full force of, in the form of bland and monotonous reflex shooters. Who wants to type when you can click?

Admittedly, the widespread adoption of the mouse propelled the point-and-click into the spotlight; but there was a time when having a mouse was a privilege, and not every system came with one – much like 3D accelerators before the arrival of the RIVA TNT2 and GeForce2 MX.

Just like a Z-Machine or text parser game, SCUMM requires the player to use keywords to communicate with the world. However, SCUMM limits the number of keywords a player can use, effectively streamlining the whole adventuring process. So rather than guessing or deducing the correct combination of nouns and verbs needed to accomplish a task, ie 'give apple to teacher,' all a player has to do is click on select verbs – 'Give,' 'Use,' 'Talk' – and then the item they wish to apply the action to. In some games, these verbs could be used in combination ('give apple to teacher using catapult'), while others went as far as to make certain items context-sensitive – especially objects that only had one logical use, such as a gun or flux capacitor.

However, part of the fun of adventure gaming is using items in strange and unobvious ways, and it was the sign of a well-designed game that blended the right amounts of initiative, creativity and frustration, and rewarded the player for perseverance and lateral thinking.

Interpreters versus engines

Compared to Half-Life, Quake and Unreal, SCUMM really doesn't fit into the category of 'game engines'. Before this phrase was coined, SCUMM was referred to as an 'interpreter', and indeed, this is exactly what a game engine is.

The whole point of writing an engine, rather than a 'fixed function' lump of code and data, is to allow for flexibility in the content creation process, and this naturally lends itself to using the engine for games beyond what it was originally intended for.

The fuel of a game engine is its data files, which contain graphics, characters and dialog, as well as other content. Another benefit of writing an interpreter, rather than a full game, in code, is that it's many times easier to port just the interpreter. Considering the interpreter defines the internals of the data files – it needs to be able to read them – they can easily be copied across to any platform.

SCUMM pushed interpreter-based game design into the mainstream, and now it's unheard of that a game would be created entirely in code. Thanks to SCUMM, we have Counter-Strike, Soldier of Fortune, and soon, the Lord of the Rings-based real-time strategy Battle for Middle-Earth, which is based on the Siege engine used to make Command and Conquer Generals. The concept of reusable resources is pivotal in programming today as both a time and money saver. In fact, cash from engine licensing is bread and butter for companies such as id and Epic.

Code monkeys

As with any engine, SCUMM uses scripts to control the game environment.

Like Java, SCUMM scripts are compiled into *bytecode* – an optimised sequence of unique identifiers that each reflect an internal game function. This bytecode can be read quickly into the engine or interpreter and executed. Many 'moddable' games on the market today support their own bytecode or scripting language, including Quake (QuakeC), Quake 3 (compiles C code into its own custom bytecode), Unreal (Unreal script), Morrowind and Arcanum (both of which feature conveniently nameless scripting languages) to name a few.

Here is an example of a SCUMM script (from Curse of Monkey Island, courtesy of www.justadventure.com):

```
Actor.Init(4); Actor.Face(180); SayLineSimple(4,'/B3Kn399/Just
because you're a grownup...'); Wait.ForMessage();
SayLineSimple(4,'/B3KN400/... doesn't mean that you can waste
my time.'); Wait.ForMessage(); Actor.Init(1); Actor.Turn(180);
If(!BinVar583){ SayLineSimple(1,'/TWGT462/Hey! There's no
bottom to this mug!'); BinVar583 = 1; }
```

The language itself shares characteristics of C and Java, except of course for commands such as 'SayLineSimple' and 'Wait.ForMessage', which are all internal and unique to the SCUMM language. Keeping in mind that each game runs its own customised version of SCUMM, these internal functions and their identifiers would have varied between titles and versions of the engine.

The advantage of using bytecode was simple – it made porting easier. It's why games such as Secret of Monkey Island found its way to the Amiga and PC, while other games were stuck on the one platform.

In a bizarre twist of fate, SCUMM today continues to be a multi-platform engine – many years after its day in the spotlight – in the form of a fan-based open source project called 'ScummVM'.

Virtual maniacs

Started in 2002, ScummVM allows SCUMM-based games to run on non-DOS platforms including Linux, PalmOS, Win32 and even the Dreamcast. Lead designer James Brown had a desire to bring the older 2D games to more up-to-date platforms, but it was as much an experience in coding and reverse-engineering as it was in nostalgia. Like the abandonware movement to preserve the classics, ScummVM attempts to bring characters such as Guybrush Threepwood, Zak McKracken and Sam and Max to a new generation of gamers.

ABOVE: Guybrush Threepwood, ambassador for adventure games everywhere, hunts for treasure.

ScummVM is actually a collection of special-coded but similar engines for each SCUMM game. LucasArts made minor changes to the interpreter with each new title, and as such, ScummVM treats each a little differently. ScummVM also contains interpreters for non-SCUMM games, including Beneath a Steel Sky by Revolution and Simon the Sorcerer, by AdventureSoft.

Because the SCUMM source code was never released, and LucasArts kept development in-house, all the work on ScummVM is based on deconstructing data files and examining the execution of SCUMM games, and while ScummVM is very mature, it does contain exceptions and bugs inherent with mimicking, or indeed, emulating, the engine's capabilities.

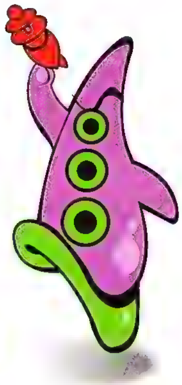
ABOVE: One of SCUMM's later outings, Sam & Max was the pinnacle of adventure gaming.

Like the original SCUMM engine, the project is broken into several components. SCUMM, as its expanded name suggests, is actually the internal scripting component of the engine. SPUTM is the engine's real name, and, along with SCUMM, contains IMUSE for rendering music and sound; SMUSH to play movies; MMUCAS, the memory management component and INSANE, a special module dedicated to handling events present in games based on SCUMM versions 7 and 8. LucasArts' SCUMM engine also contained components called CYST (character animation) and FLEM (object placement), and were added to support Curse of Monkey Island and The Dig.

Anyone interested in the inner workings of SCUMM can grab the source code for ScummVM here: cvs.sourceforge.net/viewcvs.py/scummvm/scummvm.

A piece of eight

With SCUMM, LucasArts paved the way for a more flexible and dynamic era of game development, while providing the company with its own distinct brand of entertainment.



Considering how influential SCUMM was for the games industry, it's a shame that the genre it helped to create no longer exists, and it's unlikely we'll see the likes of Monkey Island or Sam and Max again. It's yet another thing we can blame Star Wars for, along with Ewoks and Mark Hamill.

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Doom 3

John Gillooly boards the dropship and takes an express elevator to Hell.

PC

Specs

Developer:
id Software
www.idsoftware.com

Publisher:
Activision
www.activision.com.au

Distributor:
Activision
www.activision.com.au

Phone:
Activison
(02) 9869 0955

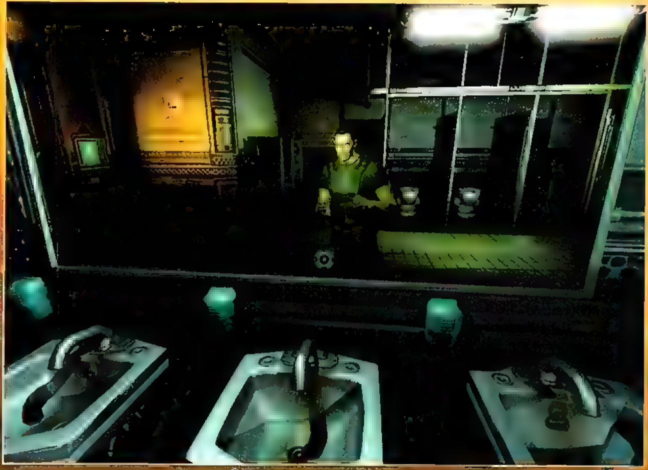
☺ Atmosphere, atmosphere, atmosphere combined with bucketloads of atmosphere.

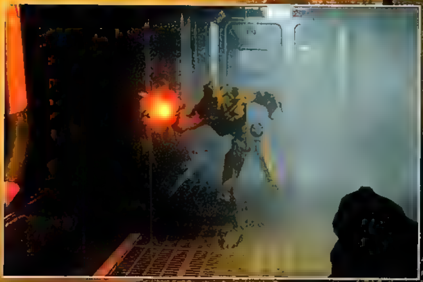
☹ The CD key is on the back of the manual not the Jewel case.

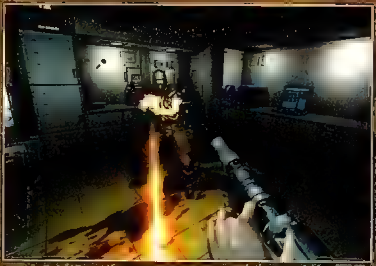
Requirements:
64MB GeForce3/RADEON 8500 or higher; 1.5GHz CPU; 384MB RAM; 2GB HDD; Windows XP/2000

Recommended:
256MB GeForce 6800 or RADEON X800 series card; 2GHz CPU; 1GB RAM; 5.1 surround sound.

You can do more with a kind word and a gun than with just a kind word.







TOP: Doom 3 features the best use of lighting in a game. Ever. **ABOVE:** The reason we learned to circle strafe is back, these fireballs will have you ducking and dodging. **ABOVE LEFT:** The regulation staring-into-a-bathroom-mirror scene. **LEFT:** No longer mindless grunts, these zombie marines use cover and tactics to good effect.

In the pre-release hype stakes few games have built anticipation like Doom 3. Not only does the Doom name hold a special place in the hearts of gamers, Doom 3 also promised to be one of the most technologically advanced games released to date. Such a combination of hype and sentimentality means that it is inevitable that the game will be approached sceptically by most gamers, but as much as people want id to fail, it has again proved why it is the king of the first person shooter.

Quite simply, Doom 3 is one of the finest gaming experiences ever delivered. The key word is *experience*, for at its heart it is a linear corridor based shooter. But unlike the majority of games to bear this moniker, it is not just an endless series of boring hallways and poorly defined enemies. From the moment the intro ends and you step off the dropship onto the surface of Mars, Doom 3 sinks in its hooks.

To reveal too much about the storyline of Doom 3 is to dampen the experience of the game, as it is the excellent story that drives it forward. You are a Space Marine sent to the UAC encampment on Mars, heading quickly into a straightforward mission to locate a missing scientist. Soon after all hell breaks loose, in quite a literal sense, and you are thrown into a rollercoaster ride that will have you jumping at the faintest of noises and perched on the end of your seat until the end is reached.

This game is all about atmosphere, the type that is delivered in big steaming buckets. It is a seamless combination of graphics, sound, art, audio and level design, and it is this that turns what could be another corridor run and gun affair into an experience not to be missed.

The majority of pre-release hype has been given to the engine coding ability of the allegedly godlike John Carmack, and it was well worth it. While games like Deus Ex: Invisible War; Thief: Deadly Shadows and Far Cry have delivered spanky lighting models, Doom 3 employs the delicate balance of light and shadow in ways never yet seen.

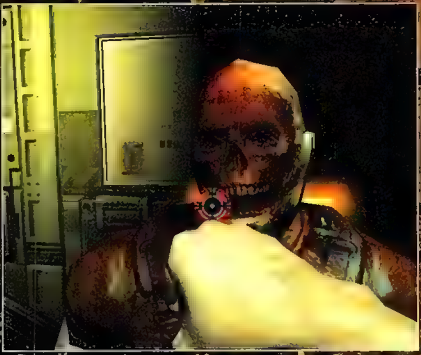
Unlike these other games, the shadowing doesn't seem to be forced on top of the environment: thanks to the way global illumination is employed it is seamless, and at the heart of it this is what makes Doom 3 special.

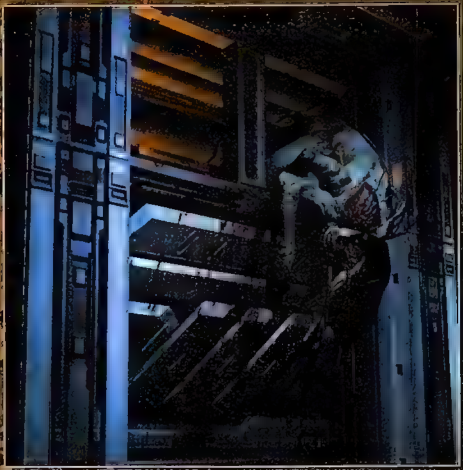
It is also one of the first games to employ normal mapping extensively and to good effect. One of the inherent problems with normal mapping is that while it makes for highly detailed characters, it is still inherently a texturing process and so models end up with angular outlines. This makes for screenshots where most characters heads look like Kryten from Red Dwarf, but in practice it is hardly noticeable thanks to some beautiful character animation and seriously fast movement.

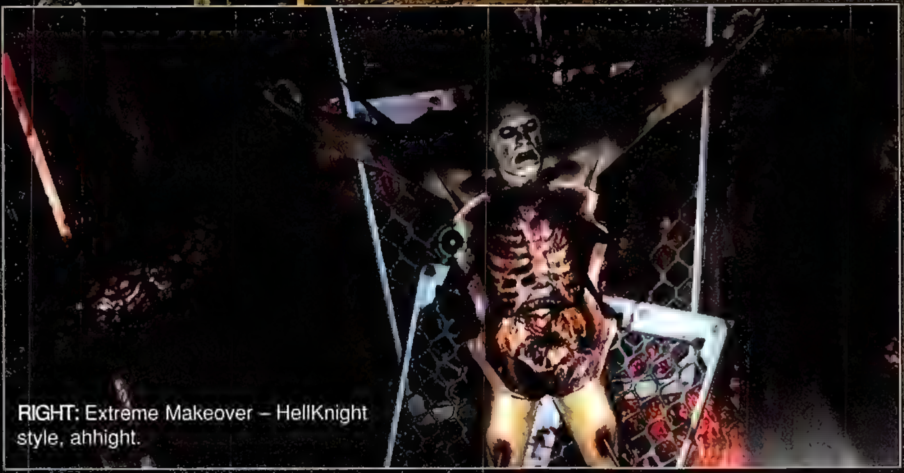
While even the token storyline of the original Doom games was bare minimum, this is more than made up for in Doom 3. The level design and storylines coalesce to create a believable sci-fi horror world, one devoid of blank featureless walls and where every nook and cranny smacks of attention to detail. In fact, this makes the games linearity so important, as atmosphere is created through the careful use of scripting and timing of events that often use the environment to maximum effect.

hotaward

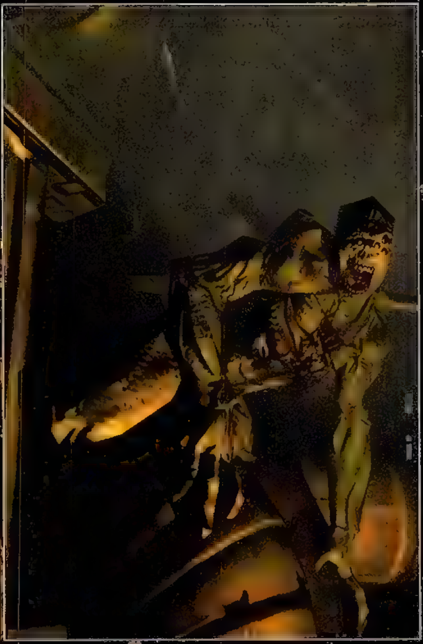
BELOW: These zombies go down quicker than Tyson after a couple of punches.
RIGHT: An open vent usually equates to an impending world of hurt.







RIGHT: Extreme Makeover – HellKnight style, ahhight.



ABOVE: The immutable Imp makes its entry.

Creatures smash through walls, zombified corpses slowly stand and lumber toward the character moaning 'braaiiinnss' and when the lights go out, you know it is brown trousers time. Rarely does this seem forced or unnatural, and while the scripted nature does diminish replayability, it enables a story driven experience that we haven't seen since Half-Life sucked days from our lives.

One of the worries held about id taking this story driven horror tack for Doom 3 was that it would mean a step away from the frenzied run and gun of the original Doom games, but strangely enough id has managed to create a wonderful sense of nostalgia that permeates the entire game. For when the attacks come they have you scrambling for cover, dodging and blasting away at the oncoming enemies.

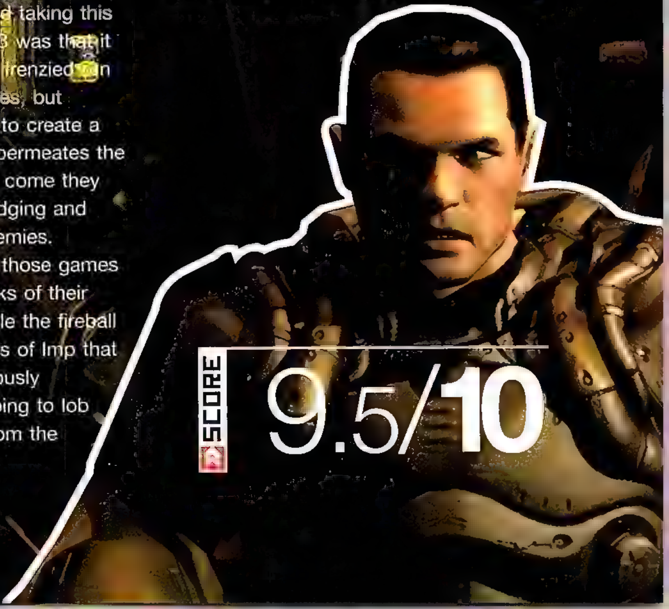
Creatures that tormented us in those games are back, and do bear the hallmarks of their sprite based forebears. For example the fireball tossing Imp (the first of many types of Imp that you encounter), which now tenaciously pursues you down hallways, stopping to lob flaming death in your direction. From the moment you first sidestep one of these fireballs you are right back in the darkened room of 1993, quaking in your boots.

Back too is the weapon dynamic we loved. The shotgun is the standout of the early part of the game, and is almost completely useless at anything but point blank range. But when up close and personal only the chainsaw comes near it in the zombie mincing stakes.

But as amazing as all of this is, what pushes the experience in Doom 3 from the phenomenal to the sublime is the audio. It is quite frankly astonishing, and it is the noises in the game that puts you on edge and keeps you frantically searching your surrounds for the next assault. Whether through stereo, headphones or surround speakers it is downright amazing.

It is worth noting that the game features four player deathmatch for multiplayer, but it is the all-encompassing single player experience that makes Doom 3 great. While at first glance this may be a survival horror take on the boring old corridor shooter, it is not only in a league above these games, it is the finest corridor shooter ever.

So upgrade your hardware, tell your friends to piss off, lock the doors, turn up the sound and go to Hell. Doom 3 is indeed the visceral masterpiece of suspense that we all desired, and yet again id has shown the world that it is the reigning king of this genre.



SCORE 9.5/10

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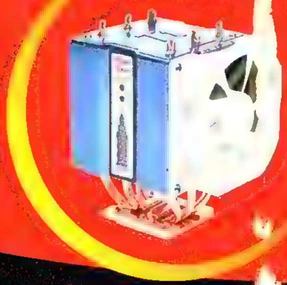

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Sudeki

John Gillooly counters Climax's paper with some sharp scissors.

XBOX Specs

Developer:
Climax
www.climax.co.uk

Publisher:
Microsoft
www.microsoft.com

Distributor:
Microsoft
www.microsoft.com

Phone:
Microsoft
13 20 58

☺ Wonderful fantasy world; fast and frenetic combat system; strong storyline.

☹ Woeful puzzles; strong linearity.

ABOVE: Well, we suppose she looks like she's about to climax...

Considering the huge popularity of Knights of The Old Republic, it's surprising there aren't more RPG titles on Xbox. While the upcoming Fable holds the attention of most, Climax studio's Sudeki has shown promise throughout its development.

Sudeki has a lot of things going for it; a compelling storyline, spangly graphics, fun realtime combat and a very well designed universe. It's heavily dosed with linearity, but is structured well enough to entertain and intrigue you as you travel through the game's central setting: the Bright Empire and worlds beyond.

There are four characters that come under your control in the game: Tal the soldier; Allish the sorceress; Buki the anthropomorphic warrior and Elco the gun-slinging steam punk. Each protagonist has specific skills and weapons at their disposal.

Combat is fast and fun, with the usual RPG assortment of flamboyant special moves and magical summoning. It only falls over during boss battles in which circumstances always mean you only have one specific character to control in a very standard 'work out the pattern of attack, dodge, fire, repeat' way.

For all the good aspects to the game, it is almost crippled by this kind of reinforcement of linearity, which gets even worse when it comes to the pseudo-puzzles that are thrown in front of your team.

While each character has a unique skill, they can only be used in carefully predefined ways. For example, Allish can 'dispel' magic used to hide objects, however, these areas are always highlighted by glittery clouds. Or Elco, who has the world's most piss weak jetpack that can only move him horizontally between platforms and needs to be fuelled by crystals, which only appear at places that he can jetpack between.

That's right – this aspect is all rock, paper and scissors. While a tried and true gameplay mechanic, it needs to be implemented spectacularly to make you feel like you aren't just following the game design script.

Unfortunately Sudeki is one of those titles that suffers from horrific implementation of this kind of gameplay, which is a real shame because underneath lies some awesome combat and an intriguing fantasy world.

It's a fun experience, but purely a time filler until Fable arrives in a month or two.

SCORE 7/10

Joint Operations: Typhoon Rising

Dan Chiappini gets ready to rumble with guerrillas in the mist.

PC Specs

Developer:
Novalogic
www.novalogic.com

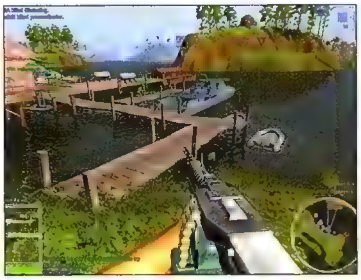
Publisher:
Novalogic
www.novalogic.com

Distributor:
Electronic arts
www.electronic-arts.com.au

Phone:
Electronic arts
(02) 9264 8999

☺ Huge maps and player numbers; wide range of vehicles and weapons; immersive team play.

☹ No single player campaign; limited long-term playability.



ABOVE: 'Johnny... does your mum still frequent dock-side bars?'

While first person shooters as a genre have been around for as long as many of us can recall, they've always been single player with only a liberal sprinkling of multiplayer so as to provide some longevity. With Joint Operations: Typhoon Rising, Novalogic has dumped this tradition completely, ditching the single player campaign and offering a LAN and internet only experience on the battlefield.

Typhoon Rising is based on the Delta Force: Black Hawk Down engine, itself a modified version of the middleware that powered Comanche 4. BHD's biggest shortcoming was its lack of drivable vehicles; however, this is not a problem in Typhoon Rising.

The game boasts 20+ usable vehicles that are great for taking to the sky, sea or hooning around the maps, as many reach multiple square kilometres in size. The armoury spans the gamut of modern warfare, and includes Smith and Wesson .357 revolvers, .50 calibre semi-auto rifles, M134 7.62mm mini-guns and a target designator for calling in mortar strikes on distant enemy positions.

Novalogic has helped newbies by included a 12-mission tutorial to get you up to speed with taking enemy locations, flying choppers and gunning down the bad guys. But if you can't fire a machine gun, or you don't have military bloodlust then this may not be the title for you.

A great engine and solid netcode allows up to 150 simultaneous players on one map, the more the merrier on 'Advance and Secure' maps where you're both holding and attacking on two fronts. A 1km draw distance and terrain specific fog makes for great air and ground combat, while a great range of skins will camouflage you in any surroundings and makes a skilled and concealed sniper a real team asset.

Although the lack of single player cripples it somewhat, the online play is solid and genuinely entertaining. War game lovers and dedicated first person shoot-'em-up fans will dig crawling through the jungle, but we can't help feel long-term playability may be somewhat lacking with no way to hone your skills offline.

Requirements
1.2GHz CPU; 256MB RAM; 32MB HW-T&L video card; DirectX 9.0; 56K internet connection
Recommended
2.4GHz CPU; 512MB RAM; 128MB HW-T&L video card; DirectX 9.0; cable or DSL internet connection.

SCORE 8.5/10

Athens 2004: The Official Video Game of the Olympic Games

Charlotte Mather takes home the gold in Athens 2004.

Developer:
Eurocom
www.eurocom.co.uk

Publisher:
Sony Computer Entertainment
www.playstation.com.au

Distributor:
Sony Computer Entertainment
www.playstation.com.au

Phone:
Sony Computer Entertainment
1300 365 911

☺ Different game playing styles and variety combined with entertaining visual concepts.

☹ Callous building and often tiresome.

ABOVE: Now you too can flip kick floating directional arrows!

The official Olympics Athens 2004 game has arrived in time to coincide with the event starting in August, so, even if you're not into watching it, you can be playing it.

In the grand tradition of all sports related games Athens 2004 is, for the most part, a button mashing bonanza. The game isn't really about strategy, and focuses more on your hand-eye coordination and the strobe-like speed of your able fingers.

Athens 2004 covers almost all Olympic activities, including the full range of athletics and swimming events, along with some gymnastics, shot put, equestrian and archery. You can be a button pushing master of any sport – tendons willing.

Of course, it's not all about button mashing. Most leg movements are a matter of mindless finger-jerking, although coordination is needed to control breathing during swim races and timing is essential in gymnastics. Matching arrow sequences to make your gymnast perform to complete, rhythmical perfection can be a challenge although during the commentary you'll be told what needs to be improved. In this case, the controller is a better alternative to a dance mat, while in athletics, running on the spot with the mat will get you better results.

Wind factor and aim are the hardest parts of archery and skeet shooting. Although still not mind-bendingly difficult, practice is needed to earn a place on the podium. Shot put, javelin and weightlifting require fast paced power build-ups, and your success will be dictated by the amount of strength you can earn before the throw, jump or lift.

Athens 2004 has three different playing styles: practice, arcade and competition, giving you the option of building your skills before competing against professionals. The movements are almost fluid-like, and although most of the women are built like men, the visuals are good. The roaring crowds and proud waves upon starting and finishing events will give you a natural competitive craving. This makes it perfect for group entertainment, and the diverse range of playing styles involved keeps you from growing tired of repetition or rushing to the finish.

SCORE 7/10

Full Spectrum Warrior

Laughing maniacally, Nathan Davis uses two to drop a tango.

Developer:
Pandemic
www.pandemicstudios.com

Publisher:
THQ
www.thq.com.au

Distributor:
THQ
www.thq.com.au

Phone:
THQ
(03) 9573 9200

☺ Insanely fun war game tactics simulator; involving gameplay; very good AI.

☹ Camera sometimes goes AWOL; no split screen co-op; occasionally the controls are fiddly.

ABOVE: At the rifle range, bang bang! At the rifle range, bang bang!

In Full Spectrum Warrior, you control two teams of four soldiers – Alpha and Beta. Using these two battalions, you must carefully plan your path ahead using tactics not unlike that used in the Army. In fact, this game is based around a training simulation used by the US Army for the doctrine known as Modern Operations in Urban Terrain (MOUT). And damn, it's exceptionally addictive. It's very realistic, so we're more inclined to call it a simulator – but a stupidly fun one at that.

It's based around team tactics. In training you discover you don't actually fire the weaponry yourself, but you are in full command of where the teams go, when to shoot, what stance to hold and so on. Sometimes even what to shoot, say, if you wish to peg a grenade at an enemy. Or to request some heavy, arse-pounding aerial support.

There's some character build up at the beginning of the game – with some army humour chucked in for good measure – showing who's who in the two teams you'll control throughout the game. But that's unfortunately about it – it would've been nice to see more character development and interaction between characters, but this is a moot point considering how much fun there is to be had.

If a team member is hurt due to your apparent incompetence, you can give medical assistance by picking the dogface up and hauling him to a medic van, if available. Once fixed, you can continue on your merry way with a fully functional division of dudes.

hotaward

One of two minor annoyances we found was for multiplayer – co-op play. You simply *must* use Xbox Live. We would've liked to have seen a split screen version. The other niggling nuisance is the movement command controls – the pointer can't go through objects and sometimes is a little touchy, making some team arrangements, like a corner formation, more difficult than it should be.

If you're after a strategic, army-based fighting game that requires elite tactical skills, this is the one to holster up. It's full of hot damn goodness and quite simply, if you have an Xbox, dump your civvies, don your soup-bowl and grab this landmark strategy title.

SCORE 9.5/10

A diplomat is someone who can tell you to go to hell in such a way that you will look forward to the trip.

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IGN.com
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Based on a training aid developed for the U.S. Army*

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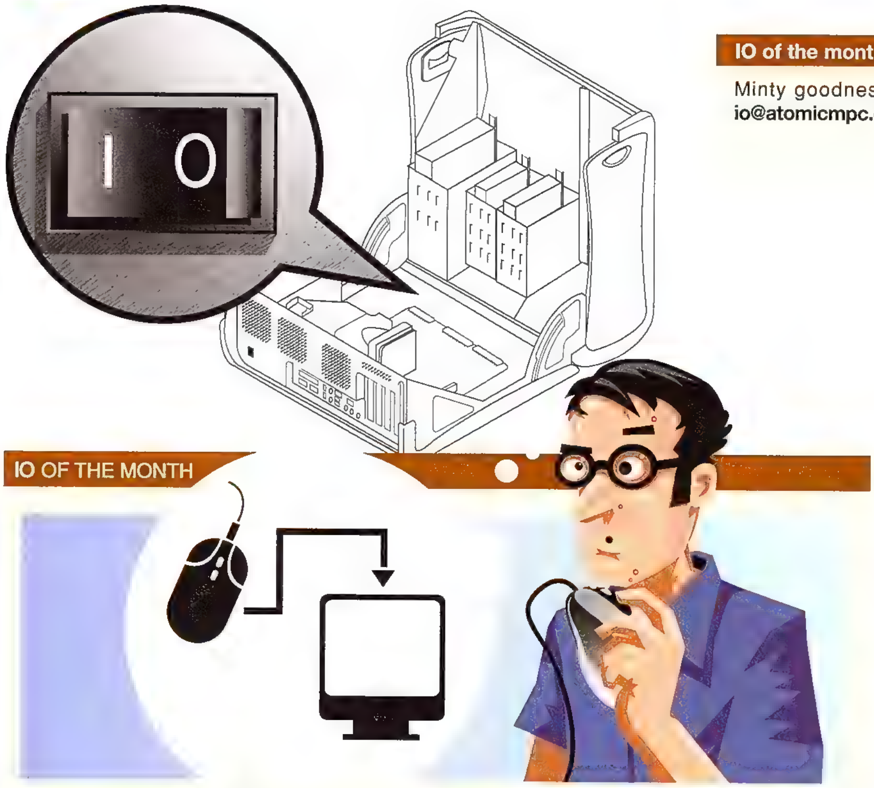


IO OF THE MONTH

IO of the month wins a Logitech MX700!

Minty goodness for the whole family!
io@atomicmpc.com.au

15 + 6 + 6 = ...15?

I've recently bought a KVM switch to hook my PCs together. While connecting them to the switch I noticed that the port for the special KVM cables that go to the PCs (the cables split into video, keyboard and mouse connections) has the same number of pins (15) as the monitor connectors do.

How can this be? If the keyboard and mouse connectors have six pins each and the monitor connectors 15, then shouldn't the KVM cable connector that connects to the switch need 27 pins?
Mark Williams

Yes, if all of the pins on the plugs were (a) in use and (b) different. But they aren't.

Even if you take the most-pins-connected version of the HD15 'VGA' pinout (we still call it VGA, even though we're not quite running 640 x 480, 16 colours any more...), with a couple of pins devoted to monitor ID, the connector still has one unused pin. That's pin nine, which is the 'key' pin that isn't even present on many VGA plugs. There are also no fewer than seven pins that are all grounds. Many cheap video extension leads and KVMs don't pass through the monitor ID pins, either, but let's assume that this one does.

The seven grounds are all tied together, and connected to the plug housings (if the housings are metal) and to the cable braid; there may also be one ground wire inside the cable. So there's quite a lot of copper devoted to the ground pins in an average VGA lead, but it's all connected together and so only counts as one conductor.

Delete the unused pin and shrink the grounds to one pin, and you've got seven pins free on a 15 pin connector.

PS/2 mouse and keyboard connectors (and the old, large AT keyboard connector too, which is only mechanically different from PS/2) only need four pins – data, ground, +5V and clock. The PS/2 connector has two unused pins; the AT keyboard connector has one unused pin. For these connectors, ground, +5V and clock can be shared, so to implement two connectors you only need five conductors. And if you want to be a real penny-pincher, the PS/2 ground can be shared with the video ground.

Hence, with a minimal layout, you can squeeze full-spec 'VGA' and a pair of PS/2 sockets into only 12 pins!

Find a whole bunch of pinouts, including the abovementioned, here: www.dvss.com/dvss/pinouts

Cone of silence

I was wondering if you could explain in plain English, or as near to it as possible, how noise cancelling headphones work. I've had a look at quite a few manufacturers' websites and did a quick Google search, but I can't find an easy-to-understand explanation.

They all mention that the headphones measure the incoming external noise then produce an 'out of phase' sound to cancel it. What does that mean? How do the headphones perform this function? It seems like there ought to be lots of fancy electronics hidden inside them, but I don't see where they'd be packed in.
Michael Shannon

The theory for noise cancelling headphones is actually pretty simple. The practice is a bit messier.

In theory, microphones mounted on the headphones (often on the backs of the ear-cups) listen to ambient noise. That signal goes to a processing module that reverses the waveform of the noise, adds that reversed waveform to the input signal (your music), and sends the result to the headphones. The processing module runs from battery power, and can be part of the headphones, for full-size units. For small headphones, it has to be a separate object.

ABOVE: Small noise-cancelling headphones need a separate electronics module.

'Result, in theory: No sound whatsoever but your music! Result, in practice: Somewhat quieter bass and midrange noise. This is because noise cancelling is harder and harder to do as the frequency of the noise gets higher.'

Good judgment comes from bad experience and a lot of that comes from bad judgment.

ABOVE: We have absolutely no idea what this is, but it looks *awesome.*

The reversed waveform causes the headphone drivers to vibrate out of phase with the noise – when a noise-sound wavefront comes in, the drivers move outwards, and vice versa. Think of it like waves in a bathtub; you can make waves with one hand, and cancel them by moving the other hand against them.

Result, in theory: No sound whatsoever but your music!

Result, in practice: Somewhat quieter bass and midrange noise.

This is because noise cancelling is harder and harder to do as the frequency of the noise gets higher.

Most noise cancelling systems only affect noise below about 1000Hz. The headphones have to physically block everything above that, which means they need to be full-sized 'circumaural' units that seal well around the ears.

Noise cancelling 'canalphones' that are poked right *into* the ear canals can also get a good seal, but they're so small that they can have problems isolating the noise-sampling microphones from the drivers.

Sibling assistance

■ I've happily used Windows XP Pro without any problems, but now one of my siblings has unchecked the 'always ask before opening files of this type' box for ZIP files in Internet Explorer. How do I get IE to go back to just asking me where to save ZIP files when I click on them?
Adon Bassford

▣ From any Explorer folder window, go to Tools —> Folder Options —> File Types. Click the Advanced button, scroll down to the entry for Zip files, and check the 'Confirm open after download' box.

USB power!

■ I've got a 40GB iRiver MP3 player. I want to know whether a USB 2.0 port can provide enough power to charge it. The iRiver AC charger is rated at 5V 2A.

I recently bought a USB 2 PCI card and it came with a cable. One end fits nicely in the USB 2 port, and the other fits very nicely in the iRiver.

Any idea whether the port can output enough and if the cable would work?
Calvin Sy

▣ iRiver say you can't do this: www.iriver.com/support/faq_view.asp?idx=282

They, of course, have not hacked up a USB-to-barrel-plug adapter to connect USB power to the DC input socket on the player.

Their argument is dumb, too; they say that USB can't *run* the device, but that doesn't mean it can't *charge* it.

ABOVE: Noise-cancelling electronics module, here's one we peeled earlier.

The player should be able to charge from any five volt source with enough current to run its Lithium-Ion battery management hardware, for which USB should be perfectly adequate.

USB power is 5V, 0.5A, per powered port. Somebody might have made a USB controller with a higher current limit, but I haven't heard of such a thing.

It'd take longer to charge that way, of course, but it still ought to work. Unless, of course, the charging hardware is not smart enough to handle a slower charge. Which it probably isn't.

In any case, there's no way that just plugging the thing into your USB adapter with that neat-o cable will work. The iRiver player is not made to accept charge current through its data connector.

Triple-header

■ Is it possible to run three mobos off one PSU?

As in, cut the cable outside the PSU, run the wires into one of those plastic cable joiners (the ones with the screws that you get from hardware stores), and then run three sets of cables from the other end? If all three motherboards power up at once, that's not a problem.

I assume most motherboards don't draw more than 100-150 watts, so a 400 watt PSU should work.

Is it possible?
Dan Hunt

▣ Yes, this is technically possible. But, obviously, you mustn't ask for more power than the PSU can deliver. The most likely source of problems here, assuming you're not running giant banks of high powered fans or eight hard drives off each board, is the CPU power supply.

This used to practically always mean the 3.3V rail, but nowadays a lot of motherboards use the 5V rail to power the CPU, and Pentium 4 systems run the CPU from *twelve* volts through a DC-to-DC converter. Similar shenanigans go on for powering other components; don't assume your video card's running from 3.3V, even if it doesn't have its own power connector.

There's not much difference between 3.3V and 5V ratings; modern PSUs have an aggregate rating for those two rails. If a PSU doesn't mention this rating on its specifications sticker, it's probably not a good PSU.

If you really want to push the limits, then you might be able to get close to 'perfectly' loading up a medium-rated PSU by powering a couple of Socket A boards and one P4 board from it, or something, but this is not really a good idea. It'd be much better to get a brand name PSU with the highest rating you can find to minimise the chance of flakiness or failure, especially if you're going to create a voltage drop by adding the three-way Y-adapter you're considering.

You only need to worry about the above if you're considering running recent CPUs. If you only want three low power boards, you're much less likely to have problems. Weedy little C3 and Eden systems count here, of course, but so does rather faster cheap-on-eBay hardware like 1GHz P-IIIs or even, if you're careful, slow Athlon XPs, as long as you don't want them all to have fifty watt video cards. You could even run some Macintosh motherboards, with a little rewiring: see tinyurl.com/ywx77

I'm figuring you're building a cluster-in-a-box sort of setup here, so you're probably more about MIPS per dollar than frames per second.

Surprisingly enough, you actually probably *could* make your Y-adapter out of hardware store screw terminal strips and have it work just fine, provided you keep all of the separate conductors for each rail separate.

If you tried to 'economise' by tieing, for example, all of the 5V wires together, you could end up passing a whole lot of current through one little two cent screw terminal. DR

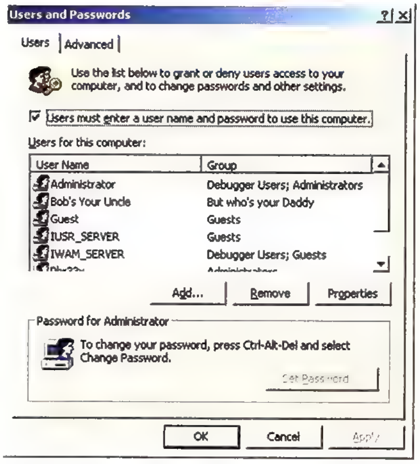
Not content to just sit around playing with the Start Bar, Simon Peppercorn delivers more wonderful Windows tweakage.

The who's who of Loginville

Depending on which options you chose when you installed Windows XP or 2K, you may or may not be required to actually log in to your workstation.

If not, then you are, by default logging in as the Administrator or another account.

To change the default login details, click Start —> Run and type in 'control userpasswords'. On the Window that opens, clear the check box for 'Users must enter a user name and password to use this computer' then hit Apply. You will then be prompted to select which account should be used as the default login. KAPLOOEY!



Use the list below to grant or deny users access to your computer, and to change passwords and other settings.

☑ Users must enter a user name and password to use this computer.

Users for this computer:

User Name	Group
Administrator	Debugger Users; Administrators
Bob's Your Uncle	But who's your Daddy
Guest	Guests
IUSR_SERVER	Guests
IWAM_SERVER	Debugger Users; Guests

Password for Administrator

To change your password, press Ctrl-Alt-Del and select Change Password.

ABOVE: Selecting your default login.

Give an unintelligent service the boot

One of my personal annoyances with XP is that even though XP appears to boot, I sometimes can't actually do anything for up to three minutes, as XP seems to temporarily hang once everything is loaded.

As it turns out the problem occurs as a courtesy of the Background Intelligent Transfer service. This service sounds like a good idea as it is supposed to allow the resumption of downloads/network transfers that were interrupted by a shutdown or log-off.

However, it often fails and causes long wait times upon reboot.

This is particularly notable if a transfer is expected to continue on reboot, but the connection is no longer present. And since many network connections are dependent on a user manually authenticating to the remote resource, can you say Catch 22? One solution, like many in the Windows world, is to simply disable the service.

Click Start —> Run and type in 'msconfig'. Next go to the Services tab, find the Background Intelligent Transfer service, and disable it. SHAZAM!

Spring clean your registry

Over time with many software installs and uninstalls your registry becomes cluttered with useless gunk you no longer need, making it memory intensive and slower to boot.

In Regedit, open 'HKEY_Local_Machine\Software'. Depending on the number of applications you have installed/uninstalled over time you will find it cluttered with remnants of registry entries that are no longer needed.

Each software developer likes to create their own registry key, so it's a matter of trawling through the list and seeing what applications have been installed within the key for each package. If you have uninstalled any particular application, and the reference still remains, reach for the delete key.

The worst damage you can do when inside this part of the registry is disable a key for an application you may actually be using. If you do this, you will need to reinstall it, to recreate the key. That is of course, unless you did a registry backup before you tinkered. You *did* do a backup, right? BIFF!

Put a Hex on your mouse

There is a problem with Windows XP and your mouse. Specifically, in the way it handles mouse acceleration – that is, the default behaviour of your cursor as you control it with the mouse. Normally it starts moving slowly then progressively accelerates as it continues across the screen. Whilst suitable for basic Windows and application navigation, it can be a real problem for many gamers and those who require precision control. Disabling acceleration involves, naturally, a trip to the registry.

Click Start —> Run and type in 'Regedit' then modify the following hex values:

```
    [HKEY_CURRENT_USER\Control
Panel\Mouse]
    "SmoothMouseXCurve"
    00,00,00,00,00,00,00,00
    00,a0,00,00,00,00,00,00
    00,40,01,00,00,00,00,00
    00,80,02,00,00,00,00,00
    00,00,05,00,00,00,00,00
    and
    "SmoothMouseYCurve"
    00,00,00,00,00,00,00,00
    66,a6,02,00,00,00,00,00
    cd,4c,05,00,00,00,00,00
    a0,99,0a,00,00,00,00,00
    38,33,15,00,00,00,00,00
```

Then, if all goes to plan and after a quick restart, your mouse precision and response should be nicely linear. BLAMMO!

Make use of that useless key

For those of you who still have a Windows key (you know, the one with the great big ugly Windows logo on it) and who haven't busted it out with a screwdriver because you kept jumping back to Windows while gaming, here is a list of shortcuts you can perform with it.

Win Key + L: Lock the workstation
Win Key + D: Minimise or restore all windows
Win Key + E: Windows Explorer
Win Key + F: Search for files
Win Key + Ctrl + F: Search for computer
Win Key + F1: Help and Support Center
Win Key + R: Run dialog box (very useful for this article)
Win Key + Break: System Properties dialog box
Win Key + Shift + M: Undo minimise all windows
Win Key + U: Utility Manager
Win Key + Q: Hold Win Key, then tap Q. Scrolls through the users accounts on your PC
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Pentium 4 3.0E (800fsb, 1MB)	375
Pentium 4 3.2E (800fsb, 1MB)	474
Pentium 4 3.4C (800fsb, 512KB)	700
Pentium 4 3.2EE (800fsb, 2MB)	1500

Intel P4 LGA775 Processors with HT	
Pentium 4 520 (2.8GHz, 800fsb, 1MB)	313
Pentium 4 530 (3.0GHz, 800fsb, 1MB)	373
Pentium 4 540 (3.2GHz, 800fsb, 1MB)	470
Pentium 4 550 (3.4GHz, 800fsb, 1MB)	705

AMD AthlonXP SocketA Processors	
AthlonXP 2500+ (1.8GHz, 333fsb, 512KB)	145
AthlonXP 2600+ (1.9GHz, 333fsb, 512KB)	162
AthlonXP 2800+ (2.1GHz, 333fsb, 512KB)	210
AthlonXP 3200+ (2.2GHz, 400fsb, 512KB)	325

AMD Athlon64 Socket754 Processors	
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Athlon64 3000+ (2.0GHz, 512KB)	385
Athlon64 3200+ (2.2GHz, 512KB)	485
Athlon64 3400+ (2.2GHz, 1MB)	715
Athlon64 3700+ (2.4GHz, 1MB)	1260

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Peter Sbarski tackles Quicktime and FOR loops to make your gurudom greater.

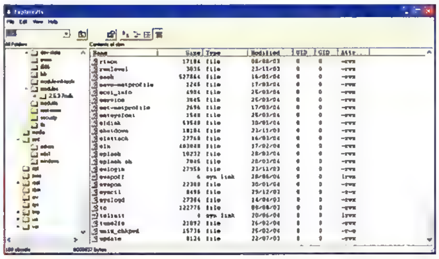
Explore2fs

This tip can belong either to the Linux or the Windows section but since a lot of Linux geeks still have to sometimes communicate with their Windows brethren, it's just as appropriate here.

If you have a PC with two or more operating systems, such as Windows and Linux, installed side-by-side you may have come across a file transfer problem. If you are in Linux and you wish to copy files from your Windows partition, or in fact any FAT or NTFS partition, all you basically need to do is mount it and copy files. Of course sometimes you may need to tweak fstab, or at worst recompile the kernel, but it is nothing too complicated. Windows, on the other hand, actively refuses to recognise any partitions that are not FAT or NTFS. And if you still use Win9x you can forget about NTFS too unless you download 3rd party applications. At most Windows refers to any non-FAT and non-NTFS partitions as 'non-dos' or 'unknown' and kindly offers to delete them.

However with the right tool, retrieving files from Linux whilst you are in Windows, can be quite simple – a program called Explore2fs (uranus.it.swin.edu.au/~jn/linux/explore2fs.htm) allows you to do just this.

Explore2fs supports the second (ext2) and the third (ext3) extended file systems and works on all flavours of Windows – an essential tool if you regularly switch boots between the operating systems. Check out the site for more information.



ABOVE: Explore your ext2/ext3 partitions from Windows.

Fun with FOR loops

FOR loops can be very powerful if you know how to use them. As a reminder, the syntax for FOR loops is: `for variable in list; do commands; done`. Here are a few useful examples:

☐ Convert all filenames to lowercase in the current directory:

```
for i in *; do mv "$i" $(echo $i
| tr '[A-Z]' '[a-z]'); done
```

☐ Convert all spaces in filenames to dash characters '-' in the current directory:

```
for i in *; do mv "$i" $(echo $i
| tr "\ " "-"); done
```

☐ List all executables in the current directory:

```
for i in *; do if [[ ! -d "$i"
&& -x "$i" ]]; then echo
"*${i}*"; fi; done
```

☐ Add an extension (eg .txt) to all filenames in the current directory:

```
for i in *; do mv "$i"
"$(basename "$i").txt"; done
```

☐ Rename the current extension (e.g. .c++) to another extension (e.g. .cpp):

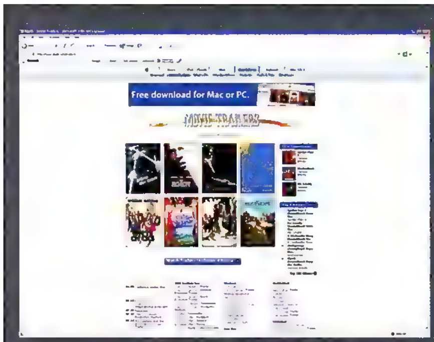
```
for i in *.c++; do mv "$i"
"$(basename "$i" .c++).cpp"; done
```

You can of course make functions out of these examples to avoid typing them out each time.

It's Leenucks

If you've ever wondered or debated about how the word Linux is actually pronounced here is the answer from the man himself, Linus Torvalds.

Download and play 'english.au' from: ftp://ftp.funet.fi/pub/Linux/PEOPLE/Linus/SillySounds/ or www.kernel.org/pub/linux/kernel/SillySounds/ and hear Linus say the word 'Linux' as its creator intended!



Embedded Quicktime

A few days ago I decided to check out the latest trailers over at www.apple.com/trailers and realised that I forgot to add Quicktime support for my browser. If you are in the same boat as me, this tip will show you how to quickly get Quicktime working on your browser. One thing that I must mention before we start, I use Firefox so this tip will only apply to Gecko based web browsers such as Mozilla, Netscape and the aforementioned, Firefox.

To get the quicktime plugin working, you should first install *mplayer* and the appropriate Quicktime codec. Mplayer is a great little application and most users should already have it. If for some reason you don't, you can get it from: www.mplayerhq.hu. You will also need to install the Quicktime codec for which you'll find mirrors for at the site.

I recommend that you download the Quicktime 6 DLL's and the Quicktime extra DLL's.

Once that's done, get the 'mplayerplugin' from mplayerplug-in.sourceforge.net. If possible get the CVS version – when I tried it, it worked best.

If you have the mozilla-devel package installed you can skip this step. If you don't then you must get it or, alternatively, download the Gecko SDK. You will find the instructions on where to get the SDK mplayerplug-in.sourceforge.net/download.html.

This next part assumes the use of the Gecko SDK. Once you have it you will need to `configure` and `make` mplayerplug-in. Usually this can be accomplished with: `./configure –with-gecko-sdk=/path/to/gecko-sdk` and then running `make`. Of course, I recommend that you check out the instructions before you compile.

If everything went fine you should see two new files: mplayerplug-in.so and mplayerplug-in.xpt appear in the main mplayerplug-in directory. These files should be copied to the appropriate Mozilla plugin directory. You can type `make install` or simply copy these two files to ~/.mozilla/plugins.

That should be enough to get Quicktime movies playing in your Gecko browser. If you don't get sound or picture whilst playing the movie, it most likely means that your mplayer Quicktime codec is not up-to-date or isn't properly installed.

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Windows XP installation super guide

Carl 'ne()phyte' Windus and Nicholas 'Nich' Constantinidis make installing a patched Windows XP SP2 system a simple affair.

There's nothing more time consuming than having to install a copy of Windows to multiple machines, let alone a single computer. The install process is slow, requires user interaction, and these days when it's completed you still need to install a host of updates and fixes to get the machine to a useable state.

Thankfully there is light at the end of the tunnel, and it's not a speeding train, or some monkey with a big torch.

This tutorial will take you through the process of automating the installation of Windows XP from a CD, complete with latest fix packs installed. You can modify this slightly to have it install over a network if you wish, and even to construct a bootable DVD. It's that simple!

Naturally, we take no responsibility for any loss of data, sanity, or sleep. We provide the tutorialage goodness, but it's up to you to ensure you backup your system first.

01 The installation timeline

Before we begin it helps to understand the installation process Windows XP follows. Dividing it up into the reboot stages:

Text mode (T-0):

- Drivers are loaded
- Setup files are copied to the hard drive
- Files are copied over from the $OEM$ directories on the CD to their equivalent locations on the hard drive

Graphical mode:

- Approx 39 minutes (T-39), 'DetachedProgram' is run (another method to install software. Very limited in what you can do)
- Devices, Network, Start Menu, and Components are installed
- 'svcpack.inf' is executed at approximately 13 minutes left (T-13)
- 'cmdlines.txt' is executed at approximately 12 minutes left (T-12)
- [SetupParams] is executed from the 'winnt.sif' file at approximately 9 minutes left (T-9)
- Settings are saved, and temporary files are deleted

First logon:

- [GuiRunOnce] (from winnt.sif) and 'RunOnceEx' are executed during the login process, and personal settings are loaded
- Desktop and 'explorer.exe' loads the GUI

With this in mind, we can get started on constructing a folder layout for our own Windows XP install disk.

02 Preliminary set up

Please note that for the purposes of this tutorial we shall be working in the 'C:' drive, or what we'll refer to as the system drive (aka %systemdrive% for those with NT-based boxes).

- In the root of your C: drive, create two folders: one called 'XPCD' and the other named 'SP2'.
- Next, inside the 'C:\XPCD' folder create the following directories:

```
cmd
$OEM$
$OEM$\$$
$OEM$\$1
$OEM$\$1\install
$OEM$\$1\drivers
$OEM$\$1\drivers\000_chpst
$OEM$\$1\drivers\001_netwrk
$OEM$\$1\drivers\002_vid
$OEM$\$1\drivers\003_vid
$OEM$\$1\drivers\004_tv_out
$OEM$\$1\drivers\005_monitor
$OEM$\$1\drivers\006_keybrd
$OEM$\$1\drivers\007_mouse
```

When you're done you should have a layout as seen in the image opposite. Some of these folders will be used at a later point in this tutorial. If your laze factor is as high as your geek quotient, you can always copy this directory structure over from this month's cover CD.

- Now that the directories and path layouts have been made, you can copy the contents of the Windows XP installation CD into 'C:\XPCD'.
- If you haven't done so already, download Service Pack 2 from Microsoft and copy it into 'C:\SP2', and rename it to 'Xpsp2.exe' Once this is done you're ready to move on to creating the slipstream stage of the process.

Time to prepare! You will need the following items in order to complete this tutorial successfully:

On the CD:

☐ XPSP1 Deployment Tools (also available for download here: download.microsoft.com/download/whistler/ToolDep/SP1/WXP/EN-US/xpsp1deploytools_en.cab)

☐ ISOBuster to extract the Windows XP boot sector from the XP CD, also available at www.smart-projects.net/isobuster

Provide yourself:

☐ Blank CD-RW or CD-Rs (a CD-RW is useful if you need to do repeated testing)

☐ A copy of Microsoft Windows XP

☐ Approximately 1.5GB of free disk space

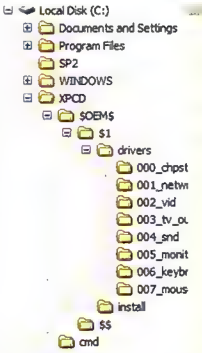
☐ A CD-R/RW or DVD±/R/RW/CD-R/RW drive

☐ CD burning software (such as Nero or Roxio Easy CD Creator)

And lastly, from the Internet:

☐ Windows XP SP2 network install. At the time of writing this can be downloaded from: www.microsoft.com/technet/prodtechnol/winxppro/default.mspx

☐ A copy of CDIMAGE.EXE, which you can grab from: flyakite.msfnhosting.com/downloads/cdimage.zip



ABOVE: Our folder structure.

03 Slipstreaming the service pack

Here comes the fun part – integrating the service pack, otherwise known as 'slipstreaming' the install.

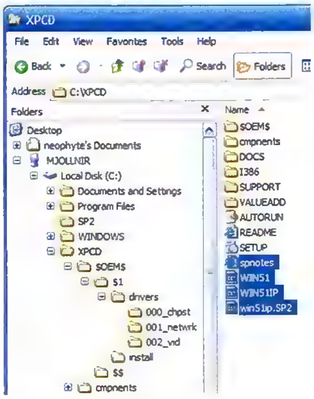
- Open a command prompt and run the following commands:

```
CD C:\
CD SP2
Xpsp2.exe /integrate:"c:\XPCD\"
```

Another dialog will appear, showing the progress of the slipstream. Once the process has been successful, a dialog box will pop up letting you know that the service pack has been integrated.

- Check to make sure you have files named: 'win51IP', 'WIN51', 'win51ip.SP2' and 'spnotes.html in the 'C:\XPCD' folder as seen in the image below.

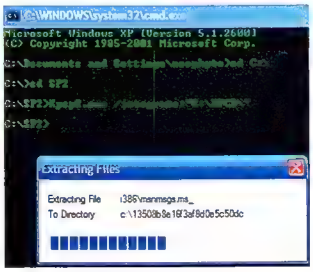
Next we need to create an answer file for the installation process. An answer file is essentially a pre-determined configuration for the installation to follow.



ABOVE: Our directory structure after the XP CD and SP2 are integrated.

04 Creating unattended answer files

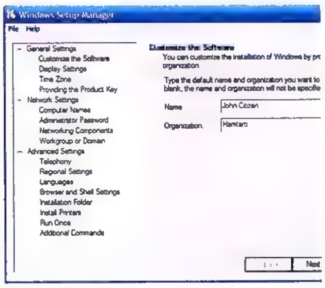
- Start by grabbing the copy of the XPSP1 deployment tools from the cover CD, extract 'setupmgr.exe' to your desktop and run it.
- A wizard will run you through each step necessary for creating the answer file; however, this is a short outline of the process:
  - When prompted, select 'Create a new answer file'
  - Choose 'Windows Unattended Installation'
  - Select the operating system you wish to create the answer file for
  - Select 'Fully automated'
  - Check the radio button 'No, this answer file will be used for installation from a CD'
  - At the Administrator Password page, make sure you select the checkbox labelled 'Encrypt administrator password in answer file'
- Save the file as 'winnt.sif' to the 'C:\XPCD\i386' folder, which would have been created when you copied the XP installation CD across.
- If you want to initiate the installation from DOS, you will need to copy both 'winnt.sif' and 'winnt.bat' to a bootable floppy disk, and run 'winnt.bat'. Now we'll cover the answer file.



```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\neophyte>cd C:\

C:\>cd SP2

C:\SP2>Xpsp2.exe /integrate:"c:\XPCD\"

C:\SP2>
```

Extracting File i386\manmegs.ms_
To Directory c:\13508b8e16f3af8d0e5c50dc

ABOVE: SP2 extracting to a temporary directory after executing integration.



You can customize the installation of Windows by pr
organization.

Type the default name and organization you want to
blank, the name and organization will not be specifie

Name: John Citizen
Organization: Hamtaro

ABOVE: Using setupmgr.exe to create an answer file for our installation.

05 Inside the answer file

The answer file is essentially the driving force of an unattended installation. It is, as its nickname suggests, the file that contains the answers for the setup process. Below is a list of the absolute minimum you would need for an unattended installation, along with an explanation, and where possible, alternative answer values. In instances where a '0' or '1' is shown, '0' is off, and '1' is on.

```
[Data]
AutoPartition=0 or 1
```

Installs Windows to the first available partition that has not already got Windows installed, and has enough free disk space. This can be dangerous on systems with multiple hard drives.

```
MsDosInitiated=0
```

This is used for installations which are being used on a bootable CD-ROM. This must be set to 0 for this particular installation method to work.

```
UnattendedInstall=Yes
```

Again, this is used for bootable CD-ROM based installs.

```
[Unattended]
Repartition=yes or no
```

'yes' will delete partitions located on the first physical disk, and quick format the new partition as an NTFS drive. 'no' will leave the drive alone.

```
UnattendMode=FullUnattended
```

This is the type of installation mode. In this instance, the end user will not be prompted to answer any questions.

```
OemSkipEula=Yes
```

Accepts the EULA on behalf of the user, preventing it from holding up the install.

```
OemPreinstall=No or Yes
```

Tells the installer to copy over all files/folders located within the i386\OEM directory (for network installs only).

```
TargetPath=\WINDOWS
```

Installs the operating system to a folder on the drive called Windows.

```
OemPnPDriversPath=
"drivers\000_chipst;drivers\003_vid"
```

Used for installing device drivers (such as motherboard chipset drivers, sound, video, etc).

```
OEMSkipRegional=1 or 0
```

Hides the regional settings dialog, or shows it during the installation. We will use a value of 1 to hide it.

```
TimeZone=260
```

Sets the time zone to East Australian. For Sydney and Melbourne use 255, Perth 225, Darwin 245, Adelaide 250, Hobart 265, and Auckland and Wellington 290.

```
OemSkipWelcome=1 or 0
```

Disables the welcome screen during the GUI installation process. A value of 0 will enable it.

```
[UserData]
ProductKey=xxxxx-xxxxx-xxxxx-xxxxx-
xxxxx
```

The product key that ships with your copy of Windows. Replace the 'x's with your key.

```
FullName="Me"
```

The name you wish to have the copy of Windows licensed to.

```
OrgName="You"
```

The organisation/company you want the software licensed to. This does not have to be filled in.

```
ComputerName="Them"
```

The name you wish to set the computer to use. This is what remote users will see the computer as, in an SMB network environment.

```
[Identification]
JoinWorkgroup=WORKGROUP
```

Joins a workgroup named WORKGROUP.

```
[Networking]
InstallDefaultComponents=Yes
```

Installs the default networking components needed to access networks (either dialup or LAN).

```
[Components]
msnexplr=off
messenger=off
```

Disables/enables Windows components

The cover CD contains some sample answer files. Please see REF.CHM in DEPLOY.CAB (located in the 'SUPPORT\TOOLS' folder of the XP install CD) for more information regarding the answer file.

After you've completed the answer file wizard, and copied the files into their appropriate locations, we can start working with the OEM folders.

06 The OEM folders

The OEM folder is a folder in which you can place files that you want to copy over during the pre-install phase. You can also use these folders to install drivers, and other applications such as command line tools that need to be placed in the 'system32' folder.

There are any number of folders you can place in here; however, they must follow a certain layout:

$1 – This is the folder in which you place anything that you want copied over to your system drive (C:\ for example). For the use of this tutorial, we will simply leave the 'drivers' and 'install' folder there.

$1\drivers – This is where any drivers go that you've added into the OemPnPDriversPath section of the 'winnt.sif' file.

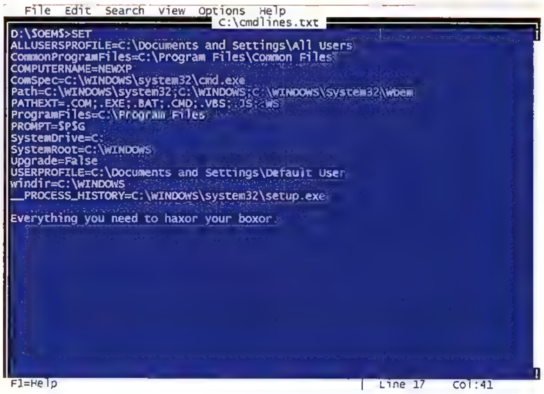
Sub-folders are created in a numerical listing, which relate to the devices you want to have Windows install drivers for.

The best layout is to number your driver folders as follows: 000_chpst; 001_netwrk; 002_vid; 003_tv_out; 004_snd; 005_monitor; 006_keybrd; 007_mouse; 008_and_so_on.

When installing drivers using this method, you will need to extract the installer and look for the folder containing the appropriate .inf files. You should note that not all device drivers can be installed using this method, and that the Windows installer cannot look for .inf files in subdirectories (you will need to put the direct path to the subdirectory in the OemPnPDriversPath section of 'winnt.sif' where necessary).

For instance, if you wished to install the NVIDIA drivers for an NVIDIA video card, you would extract the driver's installation package with Winzip (or other extraction utility), and copy the contents into the 'OEM\$1\drivers\002_vid' directory.

$$ – Files/folders placed in here will get copied into the 'WINDOWS' directory.



```
D:\$OEM$>SET
ALLUSERSPROFILE=C:\Documents and Settings\All Users
CommonProgramFiles=C:\Program Files\Common Files
COMPUTERNAME=NEWXP
ComSpec=C:\WINDOWS\system32\cmd.exe
Path=C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem
PATHEXT=.COM;.EXE;.BAT;.CMD;.VBS;.JS;.WS
ProgramFiles=C:\Program Files
PROMPT=$P$G
SystemDrive=C:
SystemRoot=C:\WINDOWS
Upgrade=False
USERPROFILE=C:\Documents and Settings\Default User
windir=C:\WINDOWS
__PROCESS_HISTORY=C:\WINDOWS\system32\setup.exe

Everything you need to haxor your boxor
```

Integrating tweaks during the installation process

The file CMDLINES.TXT is a special file that is placed in the OEM folder for execution during the installation of the operating system. It is executed regardless of the install being unattended or attended. This file is extremely useful for running small applications or integrating files into the installation that you otherwise wouldn't normally be able to.

To import registry tweaks using CMDLINES.TXT, do the following (and see the example files on the cover CD for more information):

```
[commands]
"REGEDIT /S  .\REG_TWEAK.REG"
"REGEDIT /S  .\RESTRICTED_ZONES.REG"
```

You will need to place any file called CMDLINES.TXT in the OEM directory for it to work.

Various tweak files are provided on the cover CD for your pleasure. Edit them to your preference before installing.

07 Installing programs after you've installed Windows

At this point we will be configuring the installation procedure to install several programs during the GuiRunOnce stage (see timeline at the start of this tute). By example we'll show you how to install Sun's Java virtual machine, and Ahead's Nero Burning ROM.

▪ First, copy 'CMDLINES.TXT' from the cover CD (located in 'XPCD\OEM'), and if not already, add these lines to the bottom of it:

```
REG ADD
HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion
\RunOnceEx\05 /VE /D "Sun Java VM 1.4.2" /f
REG ADD
HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion
\RunOnceEx\05 /V 1 /D
"%systemdrive%\install\j2re-1_4_2_01-windows-
i586.exe /s /v/qn" /f
```

- Make sure you have copied the Sun JVM from the cover CD and placed it into the 'XPCD\$OEM$\$1\install' directory.
- This will install the JVM silently (well, semi-silently), with Internet Explorer as the default browser Visit java.sun.com/j2se/1.4.2/docs/guide/plugin/developer_guide/silent.html for more information on configuring the install.
- For Nero Burning ROM, the process is just as simple. Grab a copy of the installer (www.nero.com/en), and add these commands to the end of 'CMDLINES.TXT':

```
    REG ADD
HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\RunOnceEx\010
/VE /D "Nero Burning ROM" /f
    REG ADD
HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\RunOnceEx\010 /V
1 /D "%systemdrive%\install\Nero.exe /silent /noreboot " /f
```

Again, remember to copy Nero into the 'XPCD\$OEM$\$1\install' directory (and rename to 'Nero.exe'.)

If you own a registered version, you can use the registry tweaks provided on the cover CD to automatically register the product. Simply search for 'Nero 6 Registration' in the 'reg_tweaks.reg' file on the cover CD.

08 Burning and testing the CD

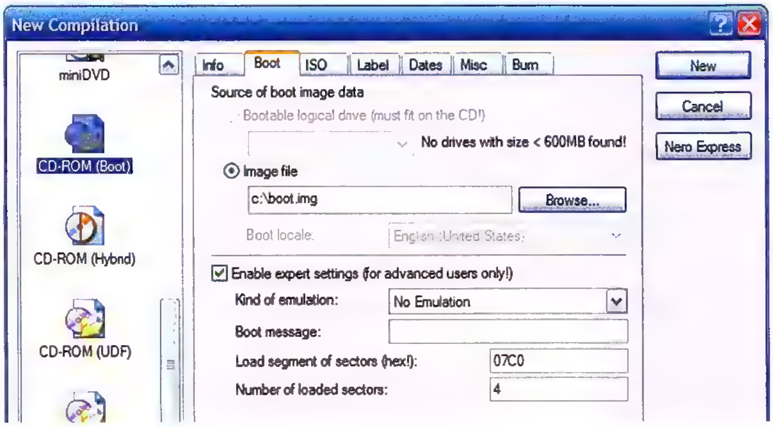
In order to burn this content to a CD we'll create an ISO image using Microsoft's CDIMAGE.EXE (which we have provided a link to on the cover CD). To do this we'll need the boot sector from the original XP install CD.

- First copy CDIMAGE.EXE to your hard drive, and then install ISOBuster.
- To extract the boot sector insert the Windows XP install CD and then run ISOBuster. Click on the 'Bootable CD' in the left pane, then right click on the file 'Microsoft Corporation.img' and right click. Select 'Extract Microsoft Corporation.img' and save it as 'boot.img' to 'C:\'.
- Go to the directory that you copied CDIMAGE.EXE to, and run it with the following commands:

```
    CDIMAGE.EXE -lWXPFPP_ENSP2 -t12/31/2002,12:00:00 -h -j1 -m
-b"C:\boot.img" C:\XPCD C:\WXPFPPEN_SP2.ISO
```

You can then burn this ISO with your favourite CD-ROM burning software and test it with a program such as VMWARE or Virtual PC 2004. It is highly recommended that you test the CD before you use it on any production machines.

And that's it! You now have a single install, up-to-date, streamlined and Windows XP install CD for all your Windows installation needs.



Source of boot image data
Bootable logical drive (must fit on the CD!)
No drives with size < 600MB found!
● Image file
c:\boot.img
Boot locale: English (United States)
☑ Enable expert settings (for advanced users only!)
Kind of emulation: No Emulation
Boot message:
Load segment of sectors (hex!): 07C0
Number of loaded sectors: 4

ABOVE: Using Ahead's Nero Burning ROM to create the bootable ISO image. There are many other CD-writing programs around capable of doing this.

That said there are additional tips, tweaks, and guides on the cover CD, including info on installing applications and enabling security settings. But before we go, here's one more tasty treat for you.

Baking, *Atomic* style

So you're armed and dangerous, you know how to slipstream a Service Pack, but can you be bothered? This isn't exactly in the spirit of 'getting in there and doing it yourself', but not everyone has the time to painstakingly go through a bunch of files and make a whole heap of tiny changes.

Never fear, we have an answer.

All good cookery shows politely provide a 'here's one we prepared earlier'. As we've been teaching you how to cook an integrated unattended install CD, we'll do the same and save your precious hands from hard labour. Well, hard typing at least.

So here's one we prepared earlier.

On the cover CD you'll find a directory structure containing the following files:

Themes

'What about setting up my favourite theme?', we hear you ask. Easily done.

First setup your theme on your current PC, and then save it. Next copy it to \XPCD\$OEM$\$$\Resources\themes and rename it to 'MyDefaultTheme.theme'. If you want to copy over any wallpapers with it, you can place them within \XPCD\$OEM$\$$\Web\Wallpaper.

Finally, make sure your winnt.sif file has the following entry:

```
    [Shell]
    CustomDefaultThemeFile=%WinDir%\resour
ces\themes\MyDefaultTheme.theme
    DefaultThemesOff=No
```

You can also use this as a means to change the default Windows XP Luna theme to the classic look by again saving whatever theme you wish to use as 'MyDefaultTheme.theme' and copying it across.

CMDLINES.TXT

We have provided a sample CMDLINES.txt below:

```
[COMMANDS]
"bootcfg /addsw /so /id 1"
".\useraccounts.cmd >> %systemdrive%\log.txt"
".\RunOnceEx.cmd >> %systemdrive%\log.txt"
```

What does it do? The 'bootcfg /addsw /so /id 1' will change your boot screen – no longer will you get the clunky 'Windows XP' animated logo. Now, you too can feel like a power user! See how much RAM you have! Watch 'chkdsk' analyse your disks! See drivers fly across your screen as they load, just like Linux!

useraccounts.cmd

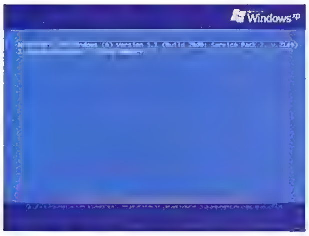
Within 'useraccounts.cmd' you'll find a nifty little script we've included to automatically log you on. All you need to do is open it up in notepad (or your favourite text editor), and enter your username and password. As an example, we've set them both to 'AtomicXP', but be warned: the created account will be given full admin privileges, and set to automatically login.

RunOnceEx.cmd

If you have a peek inside \XPCD\OEM on the cover CD you'll see a sample 'RunOnceEx.cmd' file we've included. Consider this a brief overview of the file, which can be thought of as a more stylish installer than GuiRunOnce. It looks nicer. It *oozes* class, really!

The sample file follows a specific format:

```
    REG ADD %KEY%\number /VE /D "Title to display" /f
    REG ADD %KEY%\number /V 1 /D "path to.file /and
/switches" /f
```



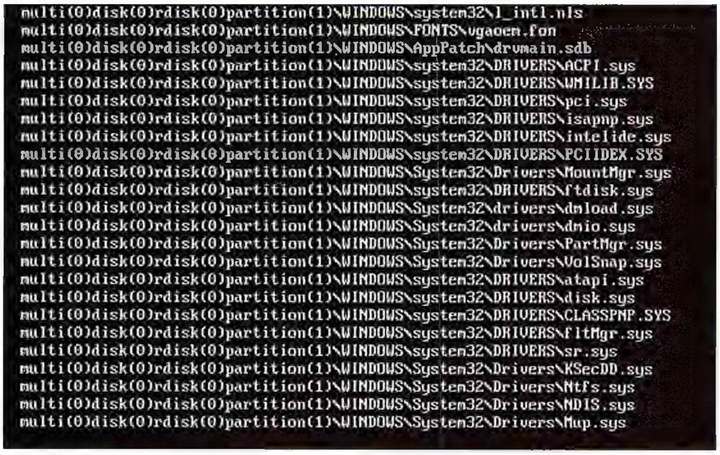
ABOVE: Get a reminder of your Windows version, every boot!

Note the numbering of each entry – we've spaced them apart so that when adding new entries, you don't have to constantly re-number subsequent entries. For anything you put in here, you'll ideally want to make sure it runs with unattended switches.

You'll see at the top of the example file we've included some code that detects if the user has an nForce motherboard, or an ATI video card. If either is found (based upon drivers installed), then the appropriate actions are taken – in this case, you'll have the nForce audio system tray icon in the system tray, or the ATI control panel, install respectively. This is a neat way to auto-detect which driver add-ons to install, but does rely upon you getting the drivers installing from 'winnt.sif' (and creating working 'setup.iss' files).

If you require more than one step to install something during 'RunOnceEx', you'll note by looking at entry '35' – Importing Registry Tweaks – that you need simply add another line, and increment the number after '/V'.

Happy streamlining!



```
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\l_intl.nls
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\FONTS\vgaoem.fon
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\AppPatch\drvmain.sdb
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\ACPI.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\WMILIB.SYS
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\pci.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\isapnp.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\intelide.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\PCIIDEX.SYS
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\MountMgr.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\ftdisk.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\drivers\dmload.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\drivers\dmio.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\PartMgr.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\VolSnap.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\atapi.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\disk.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\CLASSPNP.SYS
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\fltMgr.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\system32\DRIVERS\sr.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\KSecDD.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\Ntfs.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\NDIS.sys
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS\System32\Drivers\Mup.sys
```

ABOVE: Why watch a stripey-scrolly coloured bar, when you can watch drivers fly by instead?

Miscellaneous scripts

We've included a number of miscellaneous scripts you can elect to run. Have a browse and use any that take your fancy.

prepare.cmd

This is a rather basic script. No-one likes having Start Menu real estate being wasted on shortcuts you never use. This script neatly removes them, before you even see them! It will also copy anything you place within \XPCD\$OEM$\$1\install\$docs and $progs into 'C:\Documents and Settings' and 'C:\Program Files', respectively.

oe.cmd

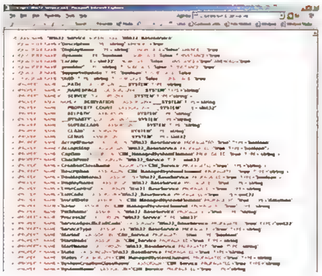
While not everyone likes to use Outlook Express, we felt it still deserved to be included in the list of applications that can be configured unattended. This neat little script looks through your registry and extracts the information required to customise things for *you*. No more pesky splash screen; attachments are now saved to your desktop (by default); your OE stash folder (the place all your mail gets saved) is now conveniently located at 'C:\Outlook Express', although you can easily change this within the script.

pmsn.cmd

You'll want to run this. Sometimes, for whatever reason, Windows will change the name of the registry key that stores Personal Media Serial Number details. This will dynamically find it for you.

cleanup.cmd

The last item that runs during an installation, this takes care of the cleanup work for you. Say sayonara to the 'ASP.NET' account that never gets used. This file will also restart your PC for you, so that all of the changes get saved.



ABOVE: Learning to script can be fun. Honest.

Acknowledgements

We would like to acknowledge MSFN.org (www.msfn.org) as the inspiration and partial research material for this tutorial, and to all the guinea pigs who helped us test!

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CI/ASUBATM

Competitions

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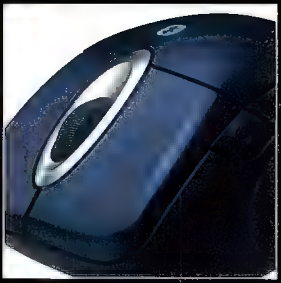
2x 256MB Imation USB Flash Drives

Flash drives are cool, fun, and eminently sexy – not only can you store stuff on them, but they can double as a fashion accessory! The Imation flash drives sport a speedy USB 2.0 connection with an impressive 256MB capacity, and use a nifty swivel cap design to protect the USB connector when not leeching files to and from your beloved beast. Thanks to Imation we have two of these nuggets of portable storage goodness to give away!

Q **What year did Imation provide its first computer tape to IBM and what was it to be used on?**



3x Microsoft Wireless Optical Mouse

Mousies. We can't live without them. Their smooth sleek lines and pixel perfect goodness make our desktops and games go round. They glow and comfort us in the night hours, and their gentle cupped caress makes our hands feel at home. But our tethered friends can often get tangled, and cord drag is clearly a cause of sucking at FPS games. Free yourself today! Microsoft is giving you the chance to win a Microsoft Wireless Optical Mouse complete with tiltable scroll wheel! We have three to give away; don't delay!

Q **How much memory did Bill Gates say would be enough for everyone?**

1x Slim Devices Squeeze Box

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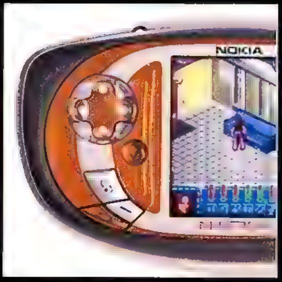
Q **What can't Daddy get any of, because of Mummy having a Squeeze Box in The Who's song 'Squeeze Box'?**



1x NGage QD + The Sims for NGage

What's better than a mobile phone? How about a mobile phone that can play *games*? And what's better than a mobile phone that can play games? How about a mobile phone that can play *The Sims*. Oh yeah, we went there. Now you need never be bored – whether out and about or sitting at home, real friends and virtual friends are always at hand with the NGage QD plus The Sims for NGage, courtesy of Nokia. You'll never want to play by yourself again. Oh yeah, we went there too. Enter now, as there's only one of these fantastic phones up for grabs!

Q **How many expansion packs have there been for the PC version of The Sims?**

EMAIL ENTRIES TO WIN@ATOMICMPC.COM.AU OR POST THEM TO: ATOMIC, PO BOX 2286, STRAWBERRY HILLS NSW 2012. PLEASE SEND A SEPARATE ENTRY FOR EACH COMPETITION. PLEASE ENSURE THE COMPETITION NAME IS THE SUBJECT OF THE EMAIL, OR IS DISPLAYED CLEARLY ON THE FRONT OF THE ENVELOPE. THE CLOSING DATE FOR ENTRIES IS 15 SEPTEMBER 2004. WINNERS WILL BE ANNOUNCED IN *ATOMIC 46*.

Atomic 42 winners: 64MB Conductorfield Fingerprint flash drive Q. What is the earliest known use of biometrics? A. Early Chinese merchants who stamped children's footprints and palm prints on paper with ink. D. Hancock, Como West, NSW. 2 x Sunwave SRC-3000 touchscreen remote controls Q. What range is the infra-red frequency? A. 750 nanometres. S. Andersson, Potts Point, NSW. G. Stearnes, Glen Huntley, Vic. 3 x Aiwa UZ-PS128 headphones Q. What's the sonic range of a dog whistle? A. 5800Hz-12400Hz. A. Burge, Lurnea, NSW. A. Humfrey, Alexandria, NSW. A. Leggett, Loganlea, Qld. 10 copies of V8 Supercars 2 for Xbox Q. What did Jim Richards call the fans after winning Bathurst in Nissan? A. "You're all a pack of arseholes." S. Gabel, Douglas, Qld. A. Felton, Edgewater, WA. L. Berry, Canning Vale, WA. S. McArthur, Studio Village, Qld. J. Tandy, Woronora Heights, NSW. J. Keen, Hamilton, Vic. P. Taylor, Palmerston North, NZ. N. Khojasteh, Eltham North, Vic. H. McLachlan, Pymble, NSW. A. Ekwebelam, Warrawong, NSW.

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CI/A44

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Current subscribers prize

*You need to be a current Atomic subscriber on 15 September 2004.

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If it were possible, we'd send each and every Atomic subscriber a big, wet kiss in an envelope. Unfortunately, neither the laws of the universe, or federal legislation, let us do this. So instead, we're giving four lucky subscribers the chance to win an EA Sports Triple Pack containing Tiger Woods USA Tour, Rugby and FIFA games.

If you're already a subscriber, all you have to do to be eligible is nothing. Zip. Nadda. You could say it's simply smashtastic, to use a completely irrelevant term.

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Altec Lansing Speakers: I Layton, Kaleen ACT. N Kwiatkowski, Brisbane QLD. N Bartosy, Carrum VIC. J Harris, Toorak, VIC. S Regan, Morley WA
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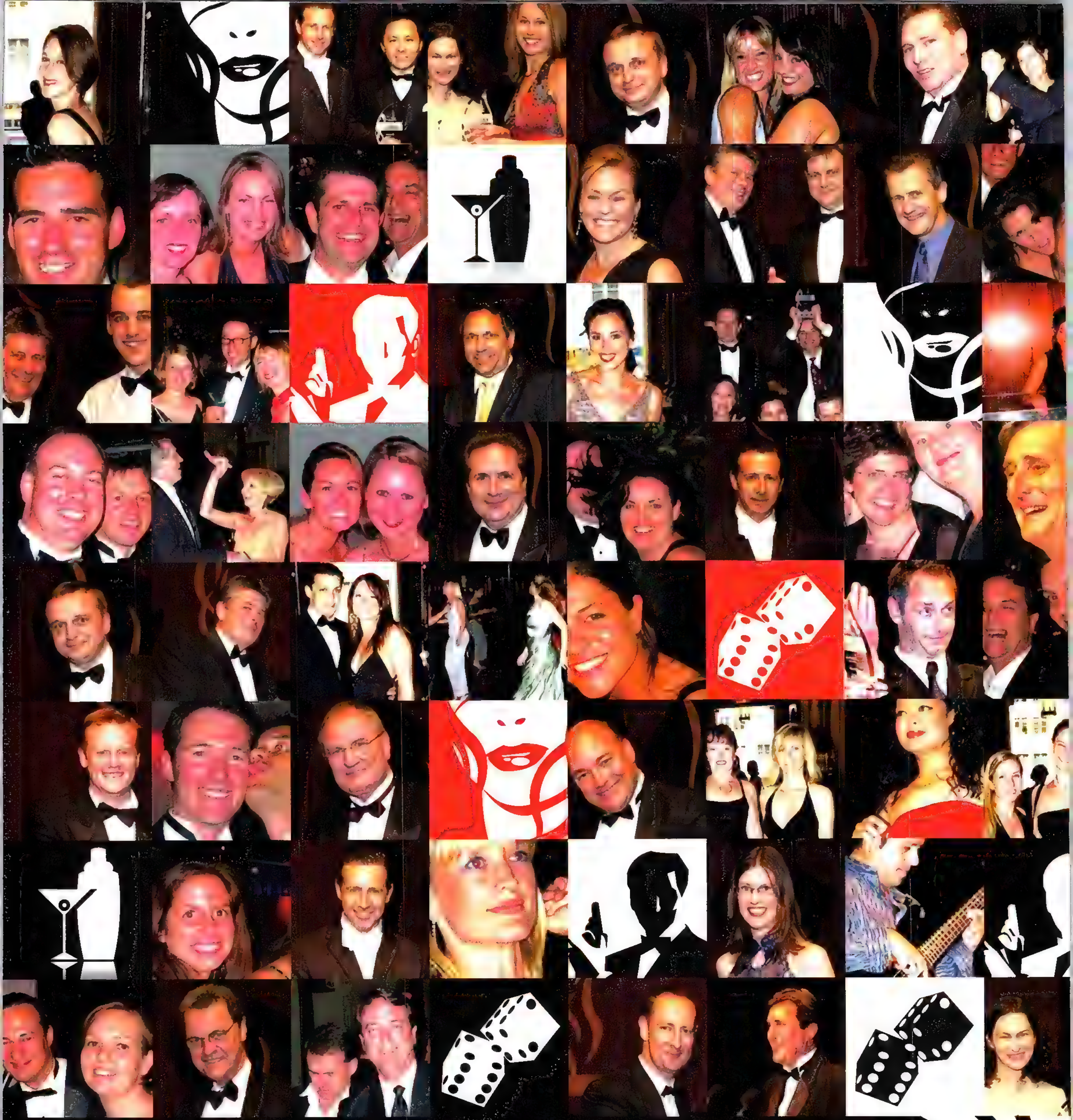

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Lost in Translation
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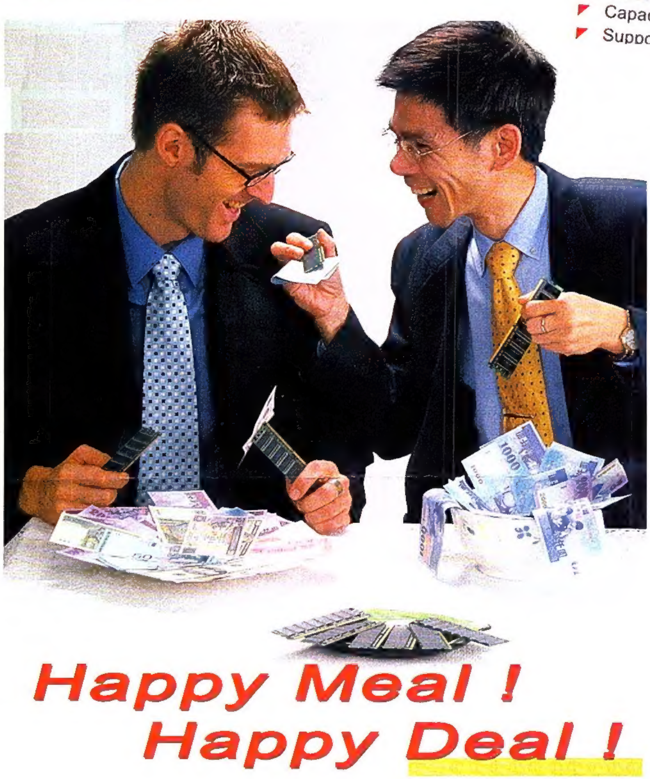
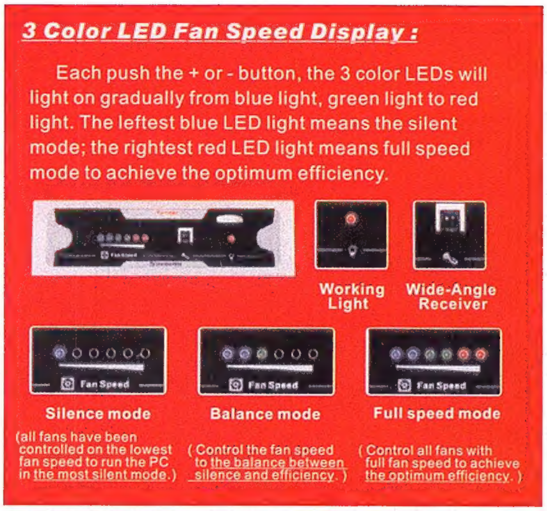
本わさび入り

Welcome to Lost In Translation, the section dedicated to the wierd and wonderful world of language mangling and the linguistic oddities we come across every day. All of these are genuine, and are presented in the spirit of friendly amusement. If you find something whacky and wonderful in your travels, in a manual, or on a box send it through to wtf@atomicmpc.com.au


Happy Meal !
Happy Deal !



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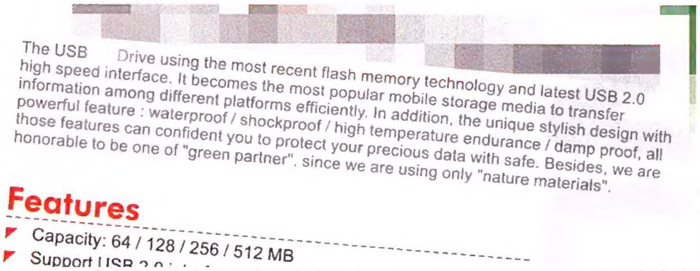
(all fans have been controlled on the lowest fan speed to run the PC in the most silent mode.)

Balance mode

(Control the fan speed to the balance between silence and efficiency.)

Full speed mode

(Control all fans with full fan speed to achieve the optimum efficiency.)



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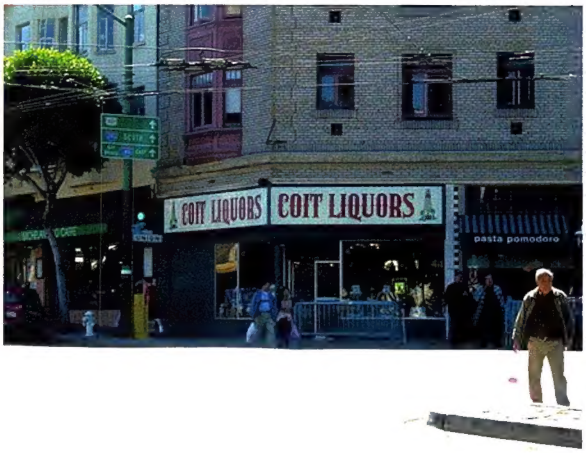


ABOVE: While 'No worries' may have permeated American culture, there are obviously a few terms that haven't crossed the Pacific, as Jeremy Kinsella found out on a recent trip to San Francisco. Thanks for sharing it with us Jeremy!

Scout about

Wide-eyed and wispy-haired, Maurice 'Moz' Ford ponders his precious.

Were you ever a scout? I was. I can't remember if I was any good at it. I try not to think about it too much. The baggy half-length pantaloons and pointed hat really bothered me. And don't get me started on the evils of woggles.

I know I picked up a few handy things from the Friday night meetings and once-in-a-while camping trips. Like some knots. And I can light a fire without igniting random parts of my body.

But the most invaluable lesson I learned was 'Be prepared'. Up until recently, whenever I left my humble hovel to venture out into the sun drenched real world, I had with me a backpack full of wondrous things that would make even Gandalf double-take.

An address book; a diary; a camera; some change for a public phone booth; a calculator; a notepad; a Game Boy; a walkman; a you-beaut digital watch; a Swiss army knife and a few other indispensable items that I won't readily admit to in public.

These days, instead of looking like a backpacker from Geeksville, I just clip a mobile phone onto my belt and I'm set. The old portable brick has come of age! Not only can it replace all the things listed above, but it can now browse the internet too! Is there anything a mobile phone can't do? Well, ok, it won't make you invisible in a pinch, but surely that technological leap can't be too far off?

Of course, with versatility comes the curse of dependence. The other day I lost my precious and my world came crashing down. Words cannot describe the horror of that day, but I'm under a contractual obligation to do so, so I'll give it a shot.

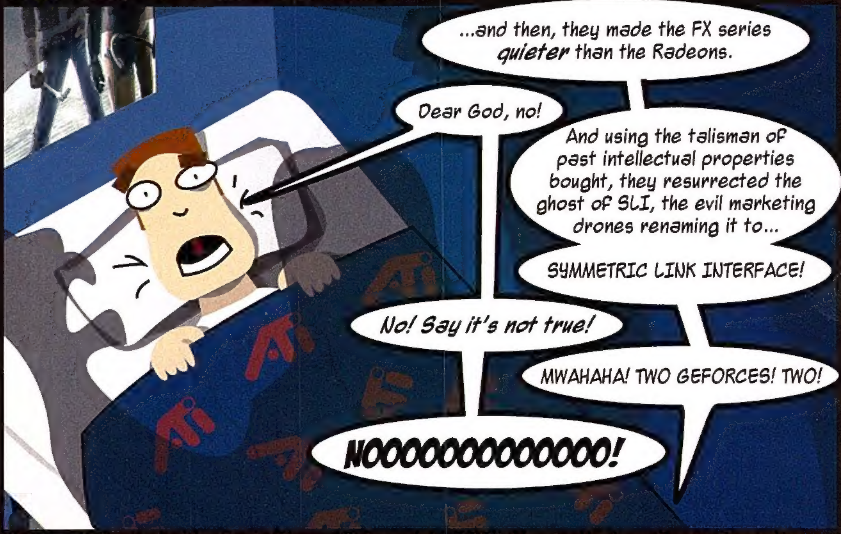
The discovery took place after returning to the office after a hard day's work in the scrub. I reached for my phone but my hand grasped thin air. It was gone! In a panic I searched the office and then the pack horse (ute), trying desperately to recall when I had last seen it. Colleagues, sensing my anxiety, attempted to assist by ringing the number but it was to no avail – my precious was gone.

As the first signs of withdrawal descended upon me I focused my thoughts. I felt my back hunch over and my eyes grew wide and glazed. Rivers of nervous sweat poured off my balding, feverish brow. And then it hit me – I had left it at the job!

Time became a blur. An insane half-hour gallop (in the ute) that would have gained me a spot with the Ring Wraiths. A wild staggering search through the night forest. My mind awhirl with unbidden thoughts – what if I could not find it? Would if I become a hollow shell of a creature, forever destined to roam these woods? How could I have lost my precious so easily? Surely it could have been designed with a more convenient and compact shape. Like a ring perhaps?

Now *there's* an idea.

Crashtest #17 - "ATI Bed Time Horror Stories"


...and then, they made the FX series *quieter* than the Radeons.
Dear God, no!
And using the talisman of past intellectual properties bought, they resurrected the ghost of SLI, the evil marketing drones renaming it to...
SYMMETRIC LINK INTERFACE!
No! Say it's not true!
MWAHAHA! TWO GEFORCES! TWO!
NOOOOOOOOOOOOO!

Written & Illustrated by Craig Simms. © Copyright 2004 Atomic: Maximum Power Computing

atomican

With an election looming, political debate in the *Atomic* General forum is generating more hot air than the World Ballooning Championships and Parliament combined.

Unwilling to 'sit idly by while the nation's youth are infected with left wing views', prominent conservatives Estate and Emperor Matej have marshalled conservative forces into Team RIGHT (www.atomicmpc.com.au/forums.asp?s=1&c=1&t=34776).

Sadly, recruitment is proving slow – Goku1989 considered joining, but became disillusioned when he found 'conservatives' not in favour of saving rainforests. Undeterred, and convinced of the rightness of, er, Rightness, Team RIGHT created a deck of cards profiling the most reviled left wing Atomicans.

While not *entirely* convinced that Team RIGHT is playing with a full deck of cards, *Atomic's* left wingers, rallied by Worms, have retaliated by forming their own Coalition of the Left (/forums.asp?s=1&c=1&t=34923&p=0). aioth joined first, wearing a Che Guevara T-shirt. The acerbic NihilisticAutomaton was also quick to enroll at the Coalition's smoky caféHQ.

But not everyone is taking sides. Ploddy created the Correct Wing, with the philosophy that whatever he says is correct. Fazz Gundam has become an antidisestablishmentarian. Charcoal has formed a Neutral Conglomeration for those who couldn't care less.

Others have become swinging voters thinking this involves sexual promiscuity.

It remains to be seen if any of these political persuasions will persuade anyone else. But as Stadl remarked: 'If politicians can carry on uninformed debates in Parliament, then by God we can carry on uninformed political debates here!'

Virt

POTM 44

Are you a Collector, Keeper, Fool, Benchmarker or Upgrader??

www.atomicmpc.com.au/forums.asp?s=1&c=1&t=41738

The psychology of the modern geek may be a complex thing. But not according to Amiga4Eva! He's broken it down into a tidy group of personality types which, theoretically, encompass us all. Even if Amiga's got it all wrong, it's a hell of a rewarding read from the bloke who brings so much quality to Atomic.

GRAPHICS BY ATI

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